ETLA ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY

ENEPRI
EUROPEAN NETWORK OF ECONOMIC POLICY RESEARCH INSTITUTES

TIME USE, HEALTH AND RETIREMENT

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ENEPRI RESEARCH REPORT NO. 3

SEPTEMBER 2004

Research for this paper was funded under the Quality of Life Programme of the EU Fifth Research Framework Programme of the European Commission (contract no. QLK6-CT-2001-00517). It was carried out in the context of a project on Aging, Health and Retirement in Europe (AGIR) – which started in January 2002 and involved several ENEPRI partners and one outside institute – and is submitted as Work Package 3 under the contract. It is published in the ENEPRI Research Report publications series, which is designed to make the results of research projects undertaken within the ENEPRI framework publicly available. The findings and conclusions should be attributed to the authors in a personal capacity and not to the European Commission or to any institution with which they are associated.

ISBN 92-9079-502-6

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Executive Summary

This study examines the time use and incentives to retire that include both the value of paid and domestic work. This is accomplished by documenting the time use in unpaid household work in a group of EU countries. An economic value is assigned to this time, which is then used in calculating the income replacement rates and the option values for retirement.

When analysing the differences in time use among the countries, the variations are substantial, but can be classified along the lines of the welfare-regime typology:

1. Central Europe, which has relatively fewer paid work hours (Germany and Belgium) and average domestic work hours (Germany);
2. Small countries (Finland, the Netherlands and Portugal) and the UK, which have more paid work hours and more domestic work hours for men (except for Portugal) and women; and
3. Exceptions, such as Denmark, which has relatively little domestic work or Belgium which has little domestic work for women contrary to expectations about the continental regime.

The small number of countries does not allow for a deeper analysis of the southern regime (Portugal, Spain and Greece) or to make any definite conclusions about the Nordic regime (Denmark, Finland, Sweden and Norway). But we can see some similarity among continental countries and within another group that includes the UK and the smaller countries, with the Nordic regime being somewhat distinct from the others.

In retirement schemes, we separate there regions. 1) Central Europe (Germany), Finland and Portugal have high replacement rate and flat option value curves after the pensionable age. 2) Belgium and the Netherlands are similar but with greater incentives from retirement since pensionable age. 3) Denmark and UK have most incentive compatible systems, since replacement rates are low and option value is rising after the pensionable age. These regimes overlap to some degree with general time use patterns. It is shown that the inclusion of domestic work in incentive calcula-tions makes retiring more attractive, and that the results of the calculations correlate with actual retirement ages in Europe. Replacement rates are close to or greater than 100% when domestic work is ac-counted for.

Second part of the study examines the effects of health status on the financial incentives to retire in five European countries: Denmark, Finland, Germany, the Netherlands and the UK. We consider individuals who report having “a chronic physical or mental health problem, illness or disability” and admit being hampered by it in their daily activities at least to

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some extent having poor health status. Health status can have greater influence on the behaviour of women. If women value domestic work higher than men do, they might be more prone to retire early for health reasons in order to be able to catch the benefit from domestic work while still able perform household chores. Women in poor health have also relatively high total work burden. The average replacement rates are shown to be higher for women in poor rather than in good health. The reason is either the relatively high labour supply of women in poor health, as in Denmark and Finland, or the high domestic work supply of non-employed women in poor health, strikingly so in Denmark, Finland and Netherlands. The high dual burden while at work and domestic work opportunities may push for retirement.

Women in good health exhibit continuity of life time patterns and domestic work supply does not increase substantially after retirement. Women in poor health are instead faced with dual burden of work that can explain the withdrawal from work. The first reason is the longer total working days leading to the scarcity of leisure. The second reason is the high supply of domestic work. The dual burden of work encourages retirement. This is also shown in high replacement rates when including in them the value of household work before and after retirement. This is explained either by relatively high labour supply or by high household work supply (compared to healthy).

Health appears to have a different effect for men. It is shown that especially for healthy men the increase in domestic work after withdrawal from the labour market is large in relative terms (doubles on average), and the effect of accounting for domestic work on the financial incentive to retire is greater for them. This can be explained by the gender specialisation of work and women's continuity of life-time patterns: Men supply more paid work while women specialise in domestic work already before retirement. After retirement, women's time use changes by less than men's. The marginal value of non-paid-work time can thus be higher in the retirement decision of men.

In the small country group (Netherlands but also including the UK), health has the largest influence on labour supply. Men reporting bad or bad health work 20 hours less per week in the Netherlands and UK. Women reporting bad health work 4 to 6 hours less per week. In other countries the effects are minor or even opposite (for Danish women). We can explain country differences or differences between genders by at least four alternative points of view. The first possible explanation is justification hypothesis (Bound, 1991). Those with poor health justify low labour force participation by bad health. The disability pension rules can vary across countries explaining also the need for justification. The justification hypothesis has been also used to explain why women report more bad health than men. We, however, use fairly objective measure of health so that this should not play a crucial role. Health status had to also be estimated in other countries except for Finland. Poor health thus captures the time use effects of poor labour market status or being single that correlate with it. The second related reason can be institutions and labour market characteristics. The Netherlands have high share of part-time workers. Those with poor health have a clear alternative to lower their work burden. It is also clear that household work can play a greater role in The Netherlands compared to Scandinavian countries. A third explanation can be explained by considering health as one consumption bundle following Grossman's model (1972). Health as a consumption bundle works as a clear

substitute for paid work. Those with poor health need to consume health more and can do this only by reducing paid work hours. Moreover, health as a consumption bundle can be a clear complement for unpaid household work, especially for women. It appears that household work supply is strikingly high for women in poor health both in the Netherlands and in United Kingdom. Finally, in Grossman's approach health is also considered as a lifetime investment. Health capital corresponds to human capital so that it decays over time and requires continuing investment. The final point of view is then the possible different needs to invest in health capital and in time horizons in health capital between the countries. The Netherlands and United Kingdom may appear to be countries with fairly good health services in the event of bad health. Thus there may appear less need for working longer in order to provide funds for covering the likely health expenses in the future when being already currently in bad health.

Policy conclusions

Unpaid work and the possibilities for combining working and domestic life are very important in retirement decisions. Domestic work increases radically in non-employment. Non-employed men at age 50-64 that are in good health do on average 11 hours per week more domestic work than older employed men. Similar difference applies for older women that are in bad health. One reason for this behaviour is certainly the lack of domestic work opportunities while at work, which has clear policy implications.

The labour supply decisions of men have often been modelled taking the spouse's current labour-force status to be an unchanging, external event. The study shows that domestic life and spouse's behaviour are of no less importance in retirement decision of men than that of women. Spillovers occur not only through income effects and complementarity of leisure but also through substitutability/complementarity of domestic work and health consumption. Recent studies have found that men's retirement decisions are most sensitive to the labour market decisions of their spouses (Coile, 2003, Dahl et al., 2002, Johnson and Favreault, 2001). The increase in domestic work for men and the mild increase for women show that time allocation indeed becomes more similar in non-employment between genders. This can be explained both by complementarity of leisure and substitutability of domestic work. The policy implication is that economic incentives may work poorly unless the time use allocation decisions are properly taken into account. In this study this is indicated by the very high replacement rates when household work is accounted for.

It is also clear that retirement policies should adapt to country characteristics:

1) Central Europe with relatively short paid work hours (Germany, Belgium) and average domestic work hours (Germany) do not have similar difficulties for combining work and domestic life. However, older German women still have strikingly low labour supply.

2) Small countries (Finland, Netherlands, Portugal) and UK have long paid work hours and long domestic work hours for men (except for Portugal) and long domestic work hours for women. It is clear that well being at work and succesful combining of working and

domestic life are very important. Health has a strong effect on labour supply, which can be explained by justification hypothesis, the availability of part-time work, health consumption or by health care that does not require an increase in labour supply to provide funds for health expenditures when health is expected to deteriorate in the future.

3) Domestic work supply is low in Denmark, otherwise similar to other countries in the Nordic regime, and in Belgium. Combining working and domestic life is easier and domestic work interfere less with retirement incentives. The pension system in Belgium is, however, fairly generous.

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1. Introduction

The objective of this work is to examine the determinants of retirement. Estimates of the financial incentives to retire are corrected by individuals' valuation of domestic work and their health status. These estimates are accomplished by documenting the time used in unpaid household work in a set of European countries. An economic value is assigned to this time and used in the incentive calculations.

Further, the effects of socio-cultural and demographic factors on the distribution of household work and its value across the countries and within households are of interest. The classification of countries into welfare-regime types according to their political, social, historical and economic characteristics offers the framework for comparative examination of time use in Europe and its implications as to the retirement behaviour of the population.

The work is carried out at the Research Institute of the Finnish Economy (ETLA) and will constitute a part of ETLA's contribution to an international research programme, which the European Network of Economic Policy Research Institutes is conducting under the leadership of the Centre for European Policy Studies. The programme is entitled Ageing, Health and Retirement in Europe (AGIR) and its objectives include documenting and analysing the health of the ageing population and the decision-making by the aged with respect to retirement. Understanding the changes in the health of the population, as well as being able to link the demand for health care to health status and time use will facilitate the construction of scenarios of the future health care demand and challenges to the social security and pension systems.[1]

Exploration and documentation of time use is useful as such, since the methods of including unpaid work and household production into national accounting are constantly discussed and researched. This kind of comparative research also contributes to the work on the integration processes currently shaping the Europe Union, where the challenges of comparative research are enhanced by the increasing convergence in some of the more traditional variables used to identify regional differences and similarities in the development processes of Europe (Kosonen, 1994, p. 9).

An extensive set of multinational, harmonised time-use data derived from diary surveys conducted in 24 countries is utilised in this work. A smaller set of countries, from which the original, more detailed data are available, is examined more closely. Table 1 presents the countries that form this latter group and the years in which the surveys were conducted.

[1] For further information, see the ENEPRI website (www.enepri.org).

Table 1. Countries and years of the time-use surveys

Country	Survey year
Belgium	1999
Denmark	1987
Finland	2000
Germany	1991
The Netherlands	1995
Portugal	1999
United Kingdom	1999

In most countries, the life expectancy of workers is increasing. By the year 2050, demographic projections suggest that Europeans will live at least four to five years longer than in 2000 (European Commission, 2002). Increases in life expectancy raise the value of lifetime benefits workers receive from traditionally defined benefit social security plans because they collect benefits for more years. In countries with pay-as-you-go social security systems, this trend raises the costs of providing benefits and may force the systems towards insolvency.

Another important dimension is the increasing healthiness of the working age population (see, e.g. Costa and Steckel, 1997).[2] *A priori*, good health allows for the postponement of retirement. This is shown as an increase in labour supply (as here) or in increased incomes that raise option-values for retirement. On the other hand, healthy individuals may also have a higher demand for active leisure or may be more able to reallocate more of their time to productive activities such as domestic work. According to Piekkola and Harmoinen (Leijola) (2003), accounting for the value of domestic work in incentive calculations for the retirement decision reveals weaknesses in new pension plans, as replacement rates are close to 100%. Improving health status may only deteriorate the prolonging of working life prospects as non-work time becomes relatively more attractive. A possible policy response to the social security financing problems that arise in part because people are living longer could be to raise the retirement age. In fact, the member states of the European Community have committed to raising the retirement age (European Commission, 2002).

This analysis framework considers old-age pensions and the age at which workers can receive 'full' social security benefits, technically referred to as the normal retirement age. Most of the systems have an early retirement age so that the legal retirement age can be less than 65 years old. Many people retire at the minimum age or earlier. In Western Europe, most workers retire before the minimum age at which social security retirement benefits can be received. The term 'pensionable age' is used here to distinguish explicit disability pensions from unemployment pension pipelines. Note that lifting the pensionable age could be done so as to raise the level of benefits

[2] In Finland from 1980 to 2002 the share of disability-pension recipients at age 16-64 has decreased from 9% to 8% or to 7% with a similar age structure (Central Pension Security Institute).

received, although lifetime benefits would be reduced. The option value takes into account both the annual pensions and the expected length of lifetime when these benefits are received. Also workers who have high discount rates will place little value on the increase in benefits with postponed retirement and will tend to retire at the earliest date possible. Gustman and Steinmeier (2002) estimate that about two-fifths of those workers in the US retiring at age 62 would not postpone their retirement to age 64 if that were the new pensionable age. Table 2 includes estimates of the average ages of withdrawal from the labour force by the OECD. These figures are arrived at by using a dynamic estimation model, which utilises labour-force participation rate data over time. The difficulty of determining the actual withdrawal age lies in the labour market behaviour of those below the pensionable age on the one hand, and in the postponement of retirement by those above the pensionable age on the other. The challenge is a statistical one, and mainly arises from the lack of a comparable standard definition for the term 'retirement' (OECD, 2002a, p. 7).

Table 2. Average ages of withdrawal from the labour force in 1994-1999

	Men	**Women**
Belgium*	59.0	58.9
Denmark	62.4	61.5
Finland	59.8	60.0
France	59.3	58.4
Germany **	60.5	59.8
Italy	59.3	58.4
Netherlands **	61.6	60.1
Norway	64.2	64.7
Portugal	65.3	66.5
Spain	61.1	61.1
Sweden	63.3	61.8
United Kingdom	62.0	61.2
United States	65.1	64.2

* 1971-1976

** 1993-1998

Source: OECD.

One of the concerns about raising the pensionable age relates to those who are unable to postpone retirement because of poor health. There is evidence of the declining prevalence of disability among all age groups (for the US, see Costa and Steckel, 1997; Cutler, 2001). It is also evident that the percentage of jobs requiring strenuous physical effort has declined as well (for the US, see Manton and Stollard, 1994; Baily, 1987). In the US a mere 5% of workers receiving benefits at the current pensionable age were at risk of suffering from a rise in the pensionable age owing to the combination of poor health, lack of pension and a physically demanding job (Panis et al., 2002). For an individual, however, health status may be one of the determinants of retirement.

2. Theoretical background

2.1 Time-use theories

Gary S. Becker first presented an economic theory of the allocation of time (1965). He views households as producers of non-marketable commodities, in the production of which the inputs are market goods, time, and the skill and education of the members of the household. The production function for these household goods, such as meals and care for family members, is constrained by the time needed to generate them and financial income. The outcome is an allocation of time among work, leisure and other activities, such that the utility of the household is maximised. Becker also proposes a theory on the specialisation of work by gender, in which men specialise in market activities while women allocate their time to household production based on the theory of comparative advantage (Becker, 1981).

Becker (1965) brought the time price of consumption to economic models, but the lack of sufficient data has constrained the empirical testing of these models. This section presents Becker's influential theory of time use, but also extends his concepts somewhat. Subsequently, we discuss three alternative views under debate especially in the analysis of time use by gender. The first view is the 'dual burden of work' analysed in greater detail for women with young children. Becker's 'specialisation of genders' offers a somewhat contrasting view. Finally, 'continuity of lifetime patterns' is an important issue in the empirical analysis, where causality between the retirement decision and leisure time allocation plays a major role. If leisure time allocation remains the same after retirement, we can make more reliable conclusions of the effect of leisure preferences on willingness to retire using single cross-section data alone.

2.1.1 Traditional theory of the allocation of time

As noted above, in Becker's (1965) theory, it is assumed that the decision on the combination of market and non-market goods to be consumed lays the framework for time allocation among work, leisure and the other activities. Activities other than work and household work (production) are considered 'consumption'. Consumption decisions are constrained by the time needed in the various consumption activities as well as by the consumers' income. More time allocated for work means more income but at the same time less time for consumption.

The consumers' utility is

$$U = U(Z_i,...Z_m) \equiv U(f_1,...f_m) \equiv U(x_1,...x_m;T_1,...T_m), \quad (1)$$

where households' basic commodities $Z_i = f(x_i,T_i)$ directly enter the utility function. The utility function is maximised subject to separate constraints on the expenditure of market goods and time and to the production functions in equation (1). Let T=total time available, T_c=hours spent at consumption, T_w=hours spent at work, t_i=input of time per unit of Z_i and b_i=input of market good per unit of Z_i. The constraints are

$$\begin{aligned} &\text{a) goods constraint } \sum p_i x_i = I = V + T_w \overline{w} \\ &\text{b) time constraint } \sum T_i = T - T_w \\ &\text{c) production functions } T_i \equiv t_i Z_i \\ &\qquad\qquad\qquad\qquad\quad x_i \equiv b_i Z_i \end{aligned} \qquad (2)$$

and can be written in single constraint

$$\sum \pi_i Z_i = S' \qquad (3)$$

$$\begin{aligned} &\pi_i \equiv p_i b_i + t_i \overline{w} \\ &S' \equiv V + T_w \overline{w} \end{aligned} \quad , \qquad (4)$$

where π_i = full price of a unit of good I, S'=full income, p_i=price of market good i, $\overline{w}$= earnings per unit of work, V=other income and I=total income. Instead of valuing household work at the person's own income, we choose the net hourly wage for this kind of work in each country. We are not looking for the willingness to pay for domestic help, which would imply the use of employer's total expenditure, nor taking the opportunity-cost approach to the allocation of time. The aim is to capture the notion of the true value of this kind of work. Furthermore, since we are allowing for national variation in the pension systems, social security payments, and tax treatments of earnings, accounting for differences in the value of household work as well is logical. The same characteristics of the countries that affect the time spent in household work are also determinants of the net wage for domestic work. If female labour force participation is low on the one hand, but hiring private domestic help is common on the other, the value of household work is low. More specialisation of work by gender can be expected in this case. Conversely, where most household work is performed by the household members in addition to paid work, and by both genders, the net wage for household work is high. The allocation of work within the household is respectively expected to be more equal. Taking utility from domestic work D as separable, the utility function can be written as

$$U = U(Z_1, ..., Z_m, Z_d) \equiv U(x_1, ...x_m, x_d; T_1, ..., T_m, T_d), \qquad (5)$$

where x_i is the commodity produced and T_i is the time used in consumption and households' basic commodities $Z_i = f(x_i, T_i)$ and household commodities $Z_d = f(x_d, T_d)$ directly enter the utility function.

At this stage, it is important to consider distortions created by taxes on wages and consumption. The standard tax wedge calculations, inclusive of all taxes, and assuming that also share x of employer's social security payments are paid by individuals in the form of lower wages, are shown in Appendix A. Let $Z_w \equiv \sum p_i x_i$ and $Z_d \equiv p_d x_d$ define a single aggregate commodity in consumption, the latter in respect of domestic goods. The budget constraint inclusive of taxes on capital and wages becomes

$$Z_w = I = V(1-M_k^v) + T_w w(1-M_s-M_m-M_k) \quad , \qquad (6)$$

where $T_w w(1-M_s-M_m-M_k)$ is the value of paid work and $T_d w_d$ is the value of domestic work and

$$M_s = \frac{w(1-x)s}{w(1+(1-x)s)} = \frac{(1-x)s}{1+(1-x)s} \text{ the effect of employer's} \qquad (7)$$

social security lowering gross wages

$$M_m = \frac{wm}{w(1+(1-x)s)} = \frac{m}{1+(1-x)s} \text{ the effect of wage tax} \qquad (8)$$

rate

$$M_k = \frac{w_c k}{w(1+(1-x)s)} = \frac{w_o k/(1+k)}{w(1+(1-x)s)} = \frac{(1-m)k/(1+k)}{1+(1-x)s} \qquad (9)$$

the effect of consumption tax rate.

s = employer's social security tax

w = observed gross wages

m = average wage tax rate

k = average consumption tax rate based on pre-tax price of consumption

and where M_k^v is the equivalent tax wedge for capital income. It is clear that taxes distort the value of paid work and capital income. Domestic goods are assumed to be free of tax. Domestic work can also differ from work in the black-market economy. Earnings from the black-market economy are often used for consumption of goods available in the market and consumption taxes distort the market prices.

The time budget constraint now looks as

$$\sum T_i = T_c = T - T_w - T_d \quad . \qquad (10)$$

Spending more time on domestic work takes time away from that spent on paid work or leisure. Let $Z_w \equiv p_w \sum x_i \equiv p_w x_w$ define the composite aggregate commodity in consumption. The allocation of time between domestic work and market work is thus determined from the equilibrium condition (1)

$$\frac{\partial U}{\partial x_w}\frac{w}{p_w} = \frac{\partial U}{\partial T_d} \quad . \qquad (11)$$

A number of recent studies contribute to the analysis of the quality of leisure time. Time scarcity and the paucity of leisure time are also at the centre of discussions about the

quality of contemporary life (Robinson and Godbey, 1997). Standard working hours, which assumed a 40-hour week over five working days, are no longer the norm. Hurd (1996) suggested that in the presence of labour market rigidities the hours of work cannot be varied and the constraint will be to work more than it is desired and then not to work at all.

Dual burden of work $T_w + T_d$

Becker (1981) proposes a theory of division of labour based on comparative advantage to explain why men 'specialise' in paid work and women in unpaid work. Becker's notion is based on the idea of partnership and concentrates on the quantities of 'total work', while other time, including leisure, is used for maintaining the capital necessary in market and home work including leisure. Men have comparative advantages in market work (a higher wage level in l.h.s of 3) and/or hours spent in domestic work are more valuable for women ($\partial U / \partial T_d$ higher for women). The marginal utility of leisure and the allocation of time to leisure can still be considered relatively independent of time allocated to total work. Bittman and Wajcman (1999) indeed argue that specialisation can be justified if the leisure time activities are more or less the same for each spouse. We show evidence, as they do, that total working hours are relatively constant, irrespective of sex. Thus women's larger burden of domestic work often substitutes for paid work, and total working hours are the same as for men. Household work is also shared more equally between men and women in non-employment. Thus, specialisation of genders can explain the unequal allocation of homework during a lifetime and the big change experienced by men after retirement. Thus, our analysis is derived from the observation that the allocation of work within a household is determined differently across the course of a lifetime.

According to most evidence, leisure time has become scarcer (Linder, 1970; Frederick, 1995; Robinson and Godbey, 1997). This is especially the case for women (Bryant and Zick, 1996, Hochschild and Machung, 1989; Hochschild, 1997). The talk of a gender gap in leisure can be well taken for households with young children. It may not be as evident for early retired persons who only in few cases have children younger than 18 years of age.

Specialisation of work: Allocation of paid and household work varies

In this approach the marginal utility of leisure and the allocation of time to leisure are relatively independent of time allocated to total work. As discussed above, Becker proposes a theory of comparative advantage to explain why men specialise in paid work and women in unpaid work. Becker's notion is based on the idea of partnership and a concentration on the quantities of 'total work'. One way to defend the benefits of specialisation in work and unpaid work is to analyse the fruits of production: the use of leisure time generated by joint effort in work. Bittman and Wajcman (1999) argue that specialisation is justifiable if the leisure time activities are more or less the same for each spouse. It is clear that specialisation of work patterns also has direct implications for retirement. Early retirement is often believed to cause an important change in the lifetime patterns of men. OECD (2000) is concerned about the increasing passivity

among men who retire. In Huovinen and Piekkola (2002), retired men, however, appear to spend more of their time in voluntary work or neighbourhood help. According to our results, household work is shared more equally between men and women in non-employment, which offers yet another view on the specialisation of work. It seems that the allocation of work within a household is determined differently during the phases of a lifetime. One explanation could be that household work is more leisurely in nature once the individuals have retired, while during working life it is considered a burden of excess work on top of paid work. This would also imply that the value of household work could be higher in retirement since some of the non-monetary utility from paid work is transferred to household work after retirement.

In specialisation of work, total hours for paid and domestic work can be considered relatively constant. We show evidence that total working hours are relatively constant irrespective of gender. Thus the larger burden of domestic work carried out by women often substitutes paid work and total working hours are the same as for men. One potential tool for analysing the changes in working hours (T_w) and leisure time ($T - T_w - T_d$) are differences in the importance among commodities with respect to foregone earnings. These foregone earnings depend on the time and money intensity of the commodities. The basic rule is that the more time (money) intensive goods are preferred, the more leisure time (wage) one needs to consume them. The result of a wage rise depends on the normality of the goods and, particularly for less money-intensive goods, it is not straightforward to find out whether the substitution effect or the income effect on time used for leisure is the dominating one. The smoothing of total hours for work between genders in the household can, in principle, loosen the time-budget constraint, when a spouse can take a larger share of the domestic work.

Continuity of lifetime patterns: household work and active leisure varies relatively little over time

One important aspect in leisure time analysis is the possible continuity of lifetime patterns. An OECD report discusses the tendency for people to continue their leisure time-use as they have done before (OECD, 2000). This can be particularly true for women. According to our analyses of time use, women adjust their total work supply by less than men with respect to employment status. Women are also found to be less likely to retire early and, hence, to continue with the same daily routine as before (for Finnish studies, see Elovainio et al., 2001, Gould et al., 1991). If time-use patterns are continuous, observed leisure patterns that are the same over the lifetime can be used to explain the determinants for early retirement using a single cross-section data.

Continuity of lifetime patterns also mitigates the importance of the dual burden of employment if women are already able to fulfil their leisure time plans during active participation in working life. The ‘dual burden’ of women can be interpreted as the ability to carry out simultaneously several tasks. Women’s work typically involves coordinating multiple activities, ‘sequencing and prioritising of certain times’ (Adam, 1995, p. 95). It is possible that the time allocation of men is more one-dimensional. One reason for this could be the industrial organisation of labour and the specialisation of men in paid work before women (for a historical view of this process, see Thompson,

1967; Landes, 1983). The leisure time-use is thereby more bounded by clock time, and less frequently involves other activities as simultaneous activities.

2.1.2 The measure of the value of household work

The choice of the measure of the value of household work time is not straightforward and also depends on which approach is appropriate for analysing time use. In addition, whether operating on the micro- or the macro-scale affects the choice of measure. A large number of exercises aiming at valuing time have dealt with amending national accounting to include non-market work in addition to market production. In these cases the measures used have tended to differ according to the production or welfare orientation of the system (Juster and Stafford, 1991, p. 506). In systems taking the former view, the valuation of non-market time has been cost-based. The two alternative measures for the value of household work in this case are the cost of buying the service from the market or choosing to value the time with the amount of money saved by doing the job oneself. In either case, the value is essentially determined by the wage rate of a provider of such a household service added with any excess costs.

If the aim of the accounting system is to measure welfare, rather than the production cost of household work, the value of the foregone alternative activity is often chosen. Thus for an employed person, the value of an hour spent in household work is valued at his or her wage rate from market work. Juster and Stafford (1991, p. 506) discuss the strengths and the weaknesses of these valuing methods, and point out that valuing non-market work at the person's own wage yield biased estimates for individuals not employed. Furthermore, whichever wage rate is applied, the preferences of household members and the leisure utility of household work are always ignored.

This work is clearly of the welfare-oriented kind because we are considering individual decisions and not national accounts. Nevertheless, the choice of a person's own wage rate as the value of household work is not appropriate here because of several reasons. First, the incomes would rise implausibly high with own wage-rate. The non-employed do not receive a wage, and the value of their household would remain without a measure. Furthermore, the alternative own-income measure for the retired (pension income) is not a measure of the value any foregone activity as is own wage-rate. Second, the net wage of a household worker in each country entails many aspects of the society and the market for such work, which we want to be able to account for at least to some extent. Third, using the net wage for household work captures some of the intuition that for people with lower own wage-rates the value of household work can be relatively higher than for high-income individuals. Further, even if household work services were bought from the market, the amount demanded would generally be a fixed number of hours per week. Thus the household work performed at the margin would still be done by household members themselves, and the value of the work, not the cost of hiring help, is the appropriate measure of the value of household work. The idea of specialisation allows for different marginal values of domestic and paid work because these are considered separate from the leisure time decisions. It is also clear that the degree of continuity of lifetime patterns is important. If men tend to reallocate their time

more than women after withdrawal from work, the retirement decision can be more sensitive to the value of domestic work, as we indeed find to be the case for men.

2.2 Welfare regimes

Gøsta Esping-Andersen (1990, pp. 26–29) describes three welfare-based regimes of interrelations between the functional strata in the society. The classification is based on the historical legacy of institutionalisation, class, political stratification, and mobility between classes. Esping-Andersen's regimes are:

1. The liberal regime, where the state only guarantees a minimum level of welfare through assistance or subsidies, and the labour market is upheld by traditional, liberal, work-ethic norms. 'Being one's own man' though hard work and taking the responsibility for one's success or misfortune describe the attitude. The society of the liberal welfare regime is dualistic, with relatively high inequality in the economic wellbeing between the well-to-do and those who subsist on the minimum wage. Esping-Andersen for example classifies the United States, Canada, Australia and the United Kingdom into the liberal welfare regime.
2. Conservative (or corporatist) welfare regime has its roots in the strong influence of social class as a determinant of social rights, and continues to harbour status differences with its relatively small redistributive effects. The role of religion and the Catholic Church in particular –in politics and as a provider of services – and the sense of community is strong. Partly as a result of this, the family and related gender norms are of great significance in shaping the labour market, for example. Traditionally, the participation of women in paid work is low. Among European countries, Esping-Andersen finds Austria, France, Germany and Italy representative of the conservative regime.
3. The Scandinavian countries represent the Social Democratic welfare system at its purest. The welfare regime is built on the ideal of the equality of the highest standards (not of minimum needs) and a high level of universalism both in benefits and payments characterises the Social Democratic welfare regime. Everyone is covered by the public welfare system regardless of his or her income or social status. On the other hand, the strong public effort in providing these services has hindered the growth of the private sector in the field of health care and social services, for example.

Pekka Kosonen (1994, p. 23) discusses Esping-Andersen's classification in relation to methodology of comparative research and European integration, and presents his own categorisation of welfare regimes in Europe. A typology of welfare states into four schemes, based on Kosonen's classification, is applied in this work. The Scandinavian, continental, southern, and British welfare regimes are compared. While Esping-Andersen includes British society into the liberal regime with the United States and Australia, Kosonen argues that the UK was one of the early welfare states with a broad system of social insurance and public services developed during the time period between the world wars. More recently, with the reorganisation of its welfare system, the country has taken a step towards neo-liberalism. However, the UK still does not, according to Kosonen, qualify as a liberal welfare state like the United

States or Australia, where the liberal regime has been the norm from the early days of statehood. In the European context, Kosonen presents the UK as a regime of its own.

The continental regime is close to Esping-Andersen's conservative welfare state, but Kosonen differentiates the peripheral regime further. This distinction according to the location within the region emphasises the dynamics of the regional development and the political and economic integration of Europe. In this work the southern welfare regime corresponds to the peripheral regime by Kosonen, and Portugal represents the countries included in it.

Kosonen finds clear relationships between the regimes and for example female labour force participation, public social expenditure and employment levels. In terms of social security systems and the labour market structure, the Scandinavian and British regimes represent universal coverage and a strong role of the public sector in the economy, while the opposite holds in the continental and the peripheral regimes. Similarly, female labour force participation is high in the first two and low in the latter pair of regimes. In the Scandinavian regime, the female labour force participation as well as the public sector employment are higher than in the British regime, and the peripheral regime has the lowest shares, differing thus from the continental regime (Kosonen, 1995, pp. 33-45). Table 3 presents the classification applied in this with short characterisations of the welfare regimes and examples of countries falling into them, as well as references to Esping-Andersen's typology.

Table 3. Welfare regimes according to Esping-Andersen and Kosonen

	Scandinavian	**Continental**	**Southern**	**British**
Esping-Andersen	**Social Democratic**	**Conservative / Corporatist**		**Liberal**
Countries	*Finland*, Sweden, Norway, Iceland, *Denmark*	*Belgium*, *Germany*, Italy, Luxembourg, *Netherlands*, *Austria*, Switzerland	Greece, *Portugal*, Spain	*The United Kingdom*
Social security systems	Share of public social expenditure of GDP high	Share of public social expenditure of GDP high	Share of public social expenditure of GDP low	Share of public social expenditure of GDP high
	Welfare services universal	Welfare services restricted	Welfare services restricted	Welfare services universal
Structure of the labour market	Female labour force participation high	Female labour force participation low	Female labour force participation low	Female labour force participation high
	Public sector employment high	Public sector employment low	Public sector employment low	Public sector employment high

Italics: countries included the study

2.3 Time-use regimes

The level of economic development and the structure of the society, as well as the welfare regime arguably affect the time use of the population. Gershuny (2000, pp. 33–45) presents a classification of countries into time-use regimes according to alternative structures of the service economy. As a background to this observed difference in time-use, he describes the process of development and economic growth in Europe from pre-industrial to post-modern economies. When time use is viewed against this background it appears as "not a mere indicator of social change; it is itself part of the essence of social change" (Gershuny, 2000, p. 19). Economic development has through improved technical efficiency allowed societies to allocate more of their time towards activities not related to satisfying basic needs. This translates into a shift from production and consumption of low value-added goods to production and consumption of high value-added goods. Table 4 outlines the socioeconomic development from pre-industrial through industrialising to post-industrial societies and its implications on time use in production and consumption, as well as differences in time use with respect to social status and gender.

Table 4. A historical view on time use and economic development

Society	Time use	Status	Gender
Pre-Industrial	long hours in subsistence work	Small elite with leisure, no difference for others	Strong specialization in time use and
Industrial	long hours for the subordinate class	Strong differentiation in time use with respect to social class	Strong specialization in time use and
Post-Industrial	Decreasing work hours, increasing consumption	Converging work time patterns	Decreasing specialization in time use and work

Source: Gershuny (2000), p. 32.

With convergence in working times with respect to class and gender, the time-use patterns of these groups have become more similar. Keeping in mind the overall decrease in working hours and the shift towards high value-added production and consumption, we can also state that the nature of free time has changed. Differences between countries do exist, however, and Gershuny has applied the concept of welfare regimes to time use.

The existing extremes of time-use regimes are, according to Gershuny, the liberal market economy and the Social Democratic system, as well as the centrally planned economies of Eastern Europe that have entered or completed a transition towards a market economy (Table 5). Examples of the current different service economies are the United Kingdom for the liberal and Finland for the Social Democratic economy (Gershuny, 2000, pp. 42–45). The implication to this work is that Gershuny mentions the source of domestic services work as a determinant of time-use regimes: in the liberal market economy, women's unpaid work and work for low wage is the main source of household work. In the Social Democratic time-use regime, unpaid work by both genders is the source of the domestic work supply (Gershuny, 2000, p. 44).

Table 5. Time-use regimes

Economy	Distributive characteristics	Wage differentials	Income dispersion	National income	Source of domestic work
Centrally planned	Relatively egalitarian	Small	Low	Low	Women's unpaid work
Social democratic	Relatively egalitarian	Large	Low	High	Women's and men's unpaid work
Liberal market	Relatively inegalitarian	Large	High	Medium	Women's unpaid work, paid work for low wages

Source: Gershuny (2000), p. 44.

3. Data and methods

3.1 Data

An important source of data is the Multinational Time Use Study (MTUS) database, the collection and maintenance of which is overseen by the Institute of Social and Economic Research at the University of Essex in the UK, in collaboration with several national statistics bureaus and other academic institutions. It includes harmonised time-use data from time-use surveys conducted in 24 countries, with the earliest studies dating back to the 1960s, and the latest ones having been done in the most recent years. The data have been gathered by administering time-use diary surveys and linking the results to background information on the respondents, and then combining them into a database with comparability across surveys and countries (Gauthier et al., 2002).

In addition to the harmonised set of data, the MTUS team has given us access to the original data from six of the countries included in this study. Data from Portugal and Belgium are not original, but cross-tabulations by employment status, gender and time-use categories. The national surveys include a somewhat different set of questions and also the extent of the socioeconomic background information differs from country to country. However, for the purposes of this study the original data are more suitable, although more laborious to analyse owing to the different formats, coding, and languages used. The MTUS set only includes individuals aged 60 or younger, while the original sets have no age limitations. Since the decision to retire is of interest here, extending the sample to those approaching the official retirement age, 65 years in most countries, is appropriate. In addition to more work, the use of original data also brings with it room for doubt in comparability. The quality and accuracy of the data differ across countries and some variables do not exist in all of them. Such variables were constructed 'by hand' and may not be entirely identical in design with their 'readymade' counterparts in other data sets.

For the most part, the surveys have been conducted by distributing time-use diary forms to the respondents, in which they have been asked to keep record of their activities during the day in 10 or 15-minute intervals. National statistical offices, or corresponding organisations, have conducted the surveys. Some countries' data have been collected by telephone interviews, but the structure of the forms used has been similar. Persons have usually kept the diary on one day during the week and on one weekend day. Weights to correct for the weekday are either provided with the data, or have been constructed based on information on the day of the week of the diary day. From the data sets, individuals aged between 45 and 64 are selected for the analysis, because they are considered the relevant group for examining the decision to retire. Most of them have been in the labour force and contributed to the public pension schemes for long enough to qualify for pension benefits once they reach the legal retirement age. The sample sizes vary between 573 diary days for the UK and 3,643 dairy days in the case of Germany. The original data sets were selected so that the surveys would have been conducted as recently and as close to each other in time as possible. The survey years range from 1987 (Denmark) to 2000 (Finland).

The MTUS data allows for some longitudinal analysis as well, since several countries have provided the MTUS with data from successive national surveys. In this work, however, the approach is cross-sectional, partly to facilitate the financial incentive calculations, and partly to reach the best possible comparability. Of course, being able to track the same individuals through the transition from work to retirement would allow capturing changes in time use due to retirement and thus provide more accurate incentive calculations. No longitudinal surveys support this kind of panel structure, however. Time used in household work has been calculated for the employed and the employed separately, and the differences between the two groups serve as a proxy for the change in time-use after retirement.

3.2 Methods

The valuation of household work involves two steps: first we have to account for the time allocated in these activities and second, an economic value has to be assigned to the time. In this study, *household work* is defined as activities that are performed without pay, and are related to the upkeep of the household and providing for its members. It includes housework such as cooking, cleaning, laundry, childcare, shopping, maintenance-related odd jobs and related travel. For the purposes of this study, the time use is additionally divided into three other main categories: work, leisure and basic needs. *Work* includes all paid work, including breaks during the workday and related education, *leisure* entails time used in social activities (visiting friends, conversation, eating out, etc.), along with hobbies and recreation. *Basic needs* cover the activities involving personal care, hygiene, eating and sleep.

Travel between home and the workplace is included in working time, making the category representative of total working time, i.e. total work-related time away from other time use, and is not a measure of productive work. This approach is appropriate when considering individual decision-making, since the total length of a workday has more significance for a person and his or her family than how long each activity during the day takes. Other travel, with the exception of recreational travel, is considered as a separate time-use category, making the main time-use classes add up to five. Travel for purposes of recreation is considered to be recreational in nature. Travel times related to household duties not included in the measure of household work may distort the results on an individual level, but in general can be viewed as a way to correct for the possible lack in the regional representation of the data. Omitting the travel times may thus help fight the possible bias towards metropolitan areas, for example.

Table 6 provides the values of household work applied in the valuing of household work in euros per hour. These were provided by the AGIR project partners in each country. The wage costs to the employer include the social security payments paid by the employer, which equal the difference between the wage costs and the gross wage. The difference between the gross and net wages includes the social security payments made by the employee and income tax. The net wage applied for Denmark was obtained differently, and no incentive calculations have been performed for Austria. This explains why these countries do not appear in the table. Figures for France are presented for comparison although these are not otherwise included in the study.

Table 6. Wage rates for household work (euro per hour) in each country

	Belgium	France	Finland	Germany	Netherlands	Portugal	UK
Wage costs to employer	8.96	11.12	12.84	9.63	7.43	2.12	6.31
Gross wage	7.07	8.35	9.80	8.00	7.00	1.89	6.31
Net wage	3.10	6.83	7.76	5.13	5.86	1.52	6.30

*Source*s: Information has been provided by AGIR project partners.

The economic value of an hour devoted to household work is, in the case of Finland, the net hourly wage of a communal household-help worker. After accounting for taxes and social security payments as described above, the net hourly rate of €7.76 is acquired. Since the public sector involvement in providing household help to the elderly or disabled differs a great deal from country to country, and in some countries hiring private help is more common, it was essential to obtain the information from sources who know and are better able to evaluate which wage rate best describes the valuation of household work in each country. Even estimates of the black-market wages of a domestic helper were welcomed in the initial enquiries to the partner organisations, but in the end all the wage rates applied are either for a household helper or minimum wages.

3.3 Option value of retirement

We present both the year-to-year accrual rate and the incentive to working this year relative to retiring at some future optimal rate. In many pension schemes, and also in Finland, the accrual rate is much higher in the final working years before the legal retirement age. It is thus not only relevant to consider whether to retire this or next year, but also to consider postponing retirement to some future year to benefit from the enhanced accruals. Let T= the expected age of mortality at age i, t = the current period, a = the period of retirement, τ = the discount factor (set at 0.03), Y = the wage income, $P(a,Y_{r-1})_i$ = the level of pension available at age i when retiring at age a, depending on wages, k = the relative utility of the pension benefits to the wages and D = domestic work income (D_{ret} when retired). The value of additional leisure is evaluated at some opportunity income level. The lifetime utility function U_t at time t can be expressed as follows:

$$V_t(a) = \sum_{s=t}^{a-1}(1+\tau)^{-(s-t)}u(Y+D) + \sum_{s=a}^{T}(1+\tau)^{-(s-t)}PW \ , \qquad (12)$$

where $u(Y)$ is periodic-specific utility when continuing to work and $PW \equiv u\left[kP(a,Y_{r-1}) + D_{ret}\right]$ is the periodic utility after retirement. Following Stock and Wise (1990), an option value for an individual is the difference between the expected lifetime utility if the individual postpones his decisions to the optimal retirement age and the expected value if he retires today. The option value takes into account both the financial and leisure costs, the latter accruing from the

postponement of retirement. Here, an import leisure cost is the foregone domestic work, when continuing to participate in labour market. If the individual retires immediately, he loses some years of income and higher pension benefits. If he retires later, he will lose the foregone leisure time (domestic work). The option value, giving the opportunity cost of retiring today, is

$$OV_t(a^*) = E_t\left[V(a^*)\right] - V_t(t)\ , \qquad (13)$$

where E is the expectation operator and a^* is the optimal age of retirement if the individual decides not to retire at time *t*. Optimal retirement should occur at an age where the option value is negative, $OV_t \leq 0$, for all future periods of retirement (not for the next year only). A higher option value creates an incentive to stay longer at work.

Coile and Gruber (2000) examine peak value, which is the maximum increment to the actuarial present value of future retirement benefits for any possible year of retirement. As with the option value, the comparison is not made to the next year but to the optimal year of retirement in the future.

$$PKV_t(a^*) = E_t\left[PW(a^*)\right] - PW_t(t)\ ,\ \gamma = 1. \qquad (14)$$

Peak value calculations ignore the future income stream until optimal retirement. Samwick (2001) argues that this future income stream explains a large share of the variation in option value. Omission of it in peak value does not necessarily lead an option value to be a superior measure. Future earnings could be included as well in an empirical estimation as an additional explanatory variable, which in Samwick (1998) does not on average receive a significant effect. Peak value is also usually scaled by the present value of future wages until the day of optimal retirement.

$$P_t = \frac{PKV_t}{\sum_{s=t}^{a^*} w_s}\ . \qquad (15)$$

Coile and Gruber (2000) find that using a peak value approach the social security incentives turn out to have bigger influence on early retirement than what has been found in earlier studies. Peak value also compares the values of alternative dates for retirement and hence the marginal value of leisure *k* plays no important role. However, this can again be incorporated in the model by including in the analysis the present value of future earnings as an additional explanatory variable. Another difference is that workers are indifferent to the variation of income and retirement benefit over the years since k is set equal to unity. The values below unity are consistent with the preference for smooth income flows.

3.4 Calculating the optimal retirement age

We continue with the analysis with the simplest form of the utility function, namely that the utility is equal to the income itself $u(Y) = Y + D$ and $u\left[kP(a, Y_{r-1}), D_{ret}\right] = kP(a, Y_{r-1}) + D_{ret}$, where D_{ret} is domestic work when retired. Without any valuation of domestic work, equal to unity would imply that there is no disutility of working relative to being retired. Here, increased leisure time after retirement is supposed to allow for more time for domestic work, thus increasing the utility of retirement. After this correction, k is set equal to one since the marginal utility of retirement leisure is already captured by the potential increase in time for domestic work. Finally, we assume annual steady wage growth *w* at 3% (so that $\tau - w$ cancels out). Letting the normalised values to be represented by non-capital letters (12) can be rewritten as

$$v_t(a) = \sum_{s=t}^{a-1} (1+\tau-w)^{-(s-t)} + pw_t^1(a) \ , \qquad (16)$$

where $pw_t^1(a) = \sum_{s=a}^{T} (1+\tau)^{-(s-\tau)} nrr$ is pension wealth and $nrr = \frac{P(a, Y_{r-1})_i + D_{ret}}{Y + D}$ is the net replacement rate. The net replacement rate expresses in each period the ratio of net pensions and value of unpaid labour if retired to net earnings and value of unpaid labour when an individual is employed. Thus, it tells in percentage terms how high a person's income would be if he retired, compared to his income if he continued to work. This receives a value of zero until the minimum entitlement age. It is straightforward to show the respective option values and peak values.

In contrast to the approach used in Gruber and Wise (1999) we consider social security contributions while employed to affect gross wages in a way that all taxes are born by the individual (and not by the employer). Thus we do not have any separate assessment of the present value of future social security payments while at work, since it is already reflected on the level of wages. The wealth accrual relating to pension wealth is

$$\Delta pw^2(a) = pw^2{}_{t+1}(a) - pw^2{}_t(a) \qquad (17)$$

$$t(x,a) = -WA_{(x,a)} / Y_{(x,a)} \ , \qquad (18)$$

where the latter formula, pension wealth accrual per net income, shows an implicit subsidy or tax on the accrual of wealth. One point of discussion is to decide on several basic assumptions concerning the components of net replacement rates. Moreover, it has to be decided whether the gross replacement rates are calculated only or if it would be possible to take into account the different tax treatment of pensioners as well as differences in social security payments. In our study net replacement calculations take into account all tax effects, including consumption taxes. Income taxes at these income levels and the social security payments by the employer are subtracted from the earnings to arrive at net incomes. Net pensions are determined by netting pension benefits of taxes and social security payments on pensions, and the yearly accrual of pensions is taken into account. The US Social

Security Administration provides information of social security systems worldwide, and the pension accrual figures for each country are obtained from the statistics service of the SSA (US SSA, 1999b). Descriptions of tax systems in the member counties of the Organisation of Economic Cooperation and Development are utilised in accounting for tax effects on wage and pension income and are shown in Appendix C (OECD, 2002).

The calculation of net replacement rates needs good data on wages and pension systems for all the countries included. The time inputs can be calculated from the Multinational Time Use Study data held by ISER. This set has comparable diary data from several countries. However, in the calculations, one has to rely on time-use data older than the income data, as time-use surveys are normally carried out only in five- or ten-years sequences. Net replacement rates are calculated in the following way. The net replacement rates for each successive year of potential working time until the official retirement age is calculated for those aged 55. The retirement benefits depend on the retirement age and the country-specific early retirement-benefit systems. Benefit level also depends on the length of contribution periods, the rate at which individuals earn pensions by contributing, and minimum and maximum levels of pensions.

A decision has to be made whether to use a global measure of housework or the increase of leisure time (or both) or to allow national variations such as in wages and benefits. Earlier work by Gershuny (2000) suggests that for all the other main categories of time use other than leisure there could in fact be a global model. In other words most of the variation in the time allocation can be explained with other-than-country variables. Thus, “we might say a Dutch woman’s daily pattern of life has, arguably, more in common with that of a North American woman than of a Dutch man” etc. Bittman and Wajcman (1999), on the other hand, find quite significant differences in unpaid work. We decide to proceed with the analysis taking into account the national variation in time use of the European elderly in addition to socio-demographic variations. The economic value of an hour devoted to household work is, in the case of Finland, the net hourly wage of a communal household-help worker added with social security payments and benefits.

The earnings base depends on average earnings over the reference period, which, in turn, is strongly influenced by the way past earnings are indexed for pension purposes, the general increase in real earnings over the period and the age profile of earnings. We simplify the analysis by assuming constant real wages over time, but evaluate replacement rate at three different income levels. These levels are derived from the statistical concept of average production worker (APW) by OECD: individuals who earn the APW wage are fulltime production workers in the manufacturing sector whose earnings represent the average for such employees in the economy defined in OECD’s “Tax and Benefit Position of Production Workers” (OECD, 2001). A manufacturing worker is used to represent a middle-income earner. A worker earning twice as much as the middle-income earner is defined as large-income earner and someone earning two-thirds of this is a low-income earner. In two-person households, one of the household members is defined as a low-income earner and her or his wage as one-third of the middle-income earner’s. All figures shown here are averages of the calculation for the

three income levels. Life expectancy is set for the expected values, also corrected for the lower expected value for unhealthy individuals.

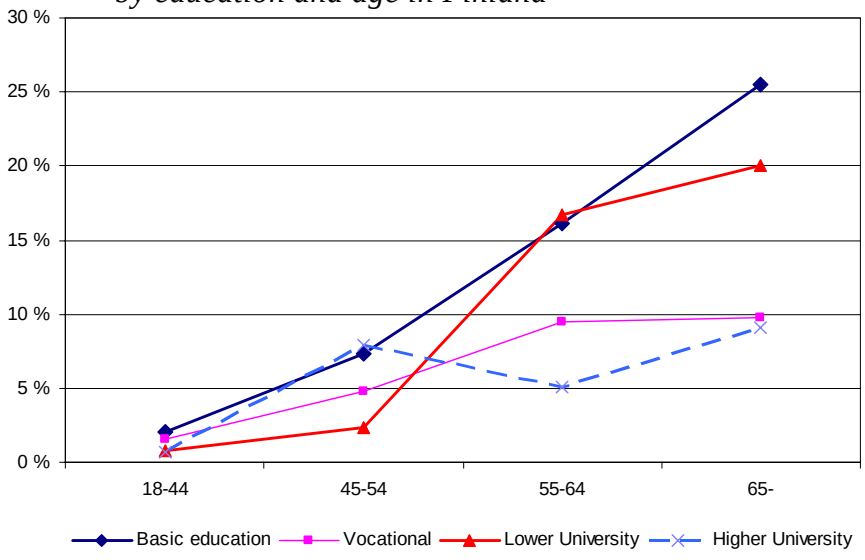
4. Time use and health status

4.1 Health status determination

Time-use studies include self-assessed health status variables only in Finland. For other countries comparable data on health is derived from the European Community Household Panel (ECHP). Ahn (2002) argues that self-reported assessments of health status in five-category questionnaires (from very poor to very good) can be very unreliable when making cross-country comparisons. The replies depend heavily on the cultural or social environment. However, demographic factors such as education level and age are persistently associated with similar individual health status across countries. We proceed along this line and assess health status by using wave 6 of the ECHP from year 1999. In the ECHP, we consider individuals who report having "a chronic physical or mental health problem, illness or disability" (European Commission (Eurostat), 2002, p. 357), and admit being hampered by it in their daily activities at least to some extent (European Commission (Eurostat), 2002, p. 358) having poor health status.

A logistic model using sampling weights is estimated in order to reveal the connection of demographic, socio-economic and time-use variables to poor health. A separate model is estimated for the employed and the non-employed, and men and women in each country, respectively, because of the relatively low number of observations and differences in the explanatory power of the model (in general greater for men). Figure 1 shows first the share of individuals with poor health that affects daily activities by education level and age in Finland.

Figure 1. Share of individuals with poor health interfering daily life by education and age in Finland



The figure reveals that health deteriorates monotonically with age especially for the less well-educated. For the highly educated, age turns out to be a much less significant factor. We include a dummy for being highly educated in the estimation as a more detailed, and yet comparable categorisation is not possible across countries. Individuals at the lowest income quartile usually have a greater chance of being in poor health. Table 7 presents the coefficients for Finland, for other countries they can be found in Appendix B.

Table 7. Logistic model for poor health status for those aged 45–64 in Finland

	Men employed	**Men Non-employed**	**Women employed**	**Women Non-employed**
Age	0.60	0.05	0.14	0.53
	(1.48)	(0.09)	(0.33)	(0.99)
Age2	-0.0049	-0.0003	-0.0013	-0.0047
	(-1.29)	(-0.06)	(-0.33)	(-0.97)
Highly educated		-0.92	-0.20	
		(-0.76)	(-0.28)	
Income percentile 25-75	-0.36	0.62	0.51	-0.06
	(-1.43)	(1.55)	(1.76)	(-0.17)
Income percentile 75-90	-0.06	0.57	-0.17	-0.58
	(-0.18)	(1.11)	(-0.45)	(-1.26)
Income percentile 90-100	-0.51	1.44	0.52	-0.29
	(-1.31)	(2.49)*	(1.33)	(-0.51)
Child < 18 years	-0.06	-0.55	-0.24	-0.28
	(-0.21)	(-0.93)	(-0.67)	(-0.45)
40+hrs a week	-0.34		0.10	
	(-1.43)		(0.4)	
Married	-0.17	-0.41	-0.57	0.01
	(-0.56)	(-1.04)	(-1.86)	(0.04)
Observations	899	358	852	413
Pseudo R2	0.03	0.02	0.01	0.01

Notes: Robust z statistics in parentheses. *significant at 5%; **significant at 1%.

Source: Authors' calculations.

The model as a whole is not very significant and only a few variables are significant at the 5% level. In all the results, coefficients are plausible and the model has, on average, greater explanatory power in other countries. It reveals that in all countries, after controlling for various demographic factors, the probability for health problems does not significantly differ for men or women, as the explanatory variables are largely the same. The primary factor explaining poor health is age. Poor health increases strongly with age among non-employed men in Germany and Denmark and among non-employed women (except in Denmark). High incomes, long working hours (for those in the labour market) and marriage (including consensual union) usually signals better health. Employed women in Finland make an exception to this rule.

The equivalent estimation for the other five countries is shown in Appendix B. At the second stage, the model is applied to the time-use data sets, and poor health status is assigned to individuals with a probability of being in poor health that corresponds to the distribution of self-reported bad health in the ECHP. For example in Finland, among the employed, 10% of individuals have a health problem that intervenes in their daily activities. Thus, the highest 10% of the probabilities acquired when the model is applied to the time-use data yield status 'poor health'. These results are then used to predict the supply of paid and domestic work of individuals with poor health.

4.2 Time use of those aged 50 to 64

In our analysis, general health status may affect both the labour sup-ply and the value of non-working time. In a cross-sectional comparison made here it is estimated that illness or disability lowers labour supply on average by 2 hours for men and 7 hours for women. Moreover, the unhealthy are not able to increase domestic work after withdrawal from work at the same magnitude as the healthy are. This, in turn decreases the attractiveness of retirement to them when the value of domestic work is accounted for. If the health problems are not severe enough to keep the unhealthy from working altogether, the overall effect can be unclear.

Table 8 presents the weekly total work hours, paid and domestic work, in our data. It is natural that the healthy individuals carry in almost all cases a heavier load of total work (exception is German men).

Table 8. Total work by gender, employment status and health, for those aged 50-64 (hours per week).

	Employed		Non-employed		Employed		Non-employed	
	Healthy	**Unhealthy**	**Healthy**	**Unhealthy**	**Healthy**	**Unhealthy**	**Healthy**	**Unhealthy**
Belgium*	42.88		23.27		41.27		37.63	
Denmark	46.46	45.38	24.76	17.99	44.21	51.14	21.09	35.68
Finland	55.34	50.12	26.24	26.79	56.30	59.87	39.04	37.67
Germany	44.17	45.50	35.54	29.32	46.22	36.94	47.01	34.98
Netherlands	54.07	45.31	27.04	26.34	51.41	52.06	36.99	34.15
Portugal*	51.22		14.93		63.47		41.77	
United Kingdom	62.13	44.96	32.39	24.23	58.20	50.68	35.46	27.82
Average	50.89	46.26	26.31	24.94	51.58	50.14	37.00	34.06

* No assessment of health available

Source: Authors' calculations.

Table 9. Women's share of domestic work by employment status and health for those aged 50-64 (hours per week).

	Employed		Non-employed	
	Healthy	**Unhealthy**	**Healthy**	**Unhealthy**
Belgium*	0.60		0.62	
Denmark	0.58	0.65	0.47	0.73
Finland	0.63	0.56	0.61	0.58
Germany	0.60	0.49	0.48	0.55
Netherlands	0.69	0.68	0.58	0.57
Portugal*	0.81		0.74	
United Kingdom	0.62	0.53	0.54	0.53
Average	0.65	0.58	0.58	0.59

* No assesment of health status available

Source: Authors' calculations.

It is seen from Table 9 that regardless of the employment status, women perform the majority of household duties. Belgium and United Kingdom exhibit the most equal allocation of time in household work, whereas the disparity is highest in Portugal. Household work is more equally allocated among the non-employed than the employed in all countries, the largest difference between the employment statuses being in the case of healthy Danes (employed: 0.78, non-employed: 0.62). Finland stands out with least variation across health and employment status. This will be touched upon again further when the results of incentive calculations are presented.

Table 10 presents the hours of paid work by gender, employment status, and gender in the samples examined. It is seen that illness or disability lowers labour supply on average by 8 hours per week for men and considerably less, by 1 hour per week, for women. Among the employed in each country, those in bad health supply substantially fewer hours of work than the healthy with the some exceptions mentioned earlier (Denmark and women in Finland). Those with poor health share paid work more equally.

Table 10. Paid work by gender and health status among the employed

	Male		Female	
	Healthy	**Unhealthy**	**Healthy**	**Unhealthy**
Belgium*	35.35		29.95	
Denmark	35.33	35.90	28.61	33.61
Finland	39.15	32.05	28.89	36.88
Germany	27.66	28.29	21.65	20.17
Netherlands	42.78	29.82	25.95	19.73
Portugal*	44.92		35.82	
United Kingdom	48.55	28.15	35.80	31.43
Average	39.11	30.84	29.52	28.36

* No assessment of health available

Source: Authors' calculations.

Table 11. Domestic work by gender, employment status and health

	Male				Female			
	Employed		**Non-employed**		**Employed**		**Non-employed**	
	Healthy	**Unhealthy**	**Healthy**	**Unhealthy**	**Healthy**	**Unhealthy**	**Healthy**	**Unhealthy**
Belgium*	7.53		23.27		11.32		37.63	
Denmark	11.13	9.48	21.31	12.33	15.60	17.53	19.16	33.18
Finland	16.19	18.08	25.04	26.35	27.41	22.99	38.70	36.97
Germany	16.50	17.21	18.33	25.90	24.57	16.77	16.77	31.20
Netherlands	11.29	15.49	26.43	25.13	25.46	32.33	36.51	33.65
Portugal*	6.30		14.93		27.65		41.77	
United Kingdom	13.58	16.81	28.26	22.98	22.40	19.25	33.24	25.48
Average	11.79	15.41	22.51	22.54	22.06	21.77	31.97	32.10

* No assessment of health available

Source: Authors' calculations.

It is seen from Table 11 that non-employed do more domestic work than employed. Non-employed healthy men devote on average 11 more hours per week in domestic work than employed healthy men. In women's case, the non-employed in good health use 9 more hours per week in domestic work than do the employed. It is evident that healthy men increase their supply of household work by relatively more when non-employed. The time use of men and women become thus more similar in retirement. The differences depending on employment status are also clear for those men with poor health. On the contrary, the total work burden is rather high for women in poor health and domestic work supply remains high in non-employment. The high dual burden may push for retirement. Men with poor health do not seem to benefit as much from the increased household work after retirement, since the change is 7 hours.

It can be concluded that shifts in time use patterns are clearer for men in good health than for women in good health. Women in good health have greater continuity of time use patterns. Healthy women do not in-crease their domestic work supply much in non-employment. On the other hand, women in bad health appear to have high dual burden on work. Thus women in poor health may be encouraged to retire.

Country differences are also striking. The continental European countries seem to exhibit more specialization in domestic work by women, and in paid work by men. Scandinavian countries and the UK share all work more equally. In Denmark and Finland women in bad health pro-vide more paid work than healthy women, which is the cause for high dual burden. In Denmark, Germany and partly in UK women with poor health have a very high domestic work supply.

Finally, the female shares of paid and total work are as expected based on the total and domestic work times, and are presented in Table 12 for the employed. Total work is shared fairly equally among older men and women, but as the large proportion of unpaid work performed by women indicated, the share of paid work done by women is lower. The dual burden of paid and domestic work appears true for women in bad health. It clear that for women younger than 50 the dual burden is also explained by child care.

Table 12. Women's share of total and paid work by health status among the employed, for those aged 50-64.

	Paid Work		**Total Work**	
	Healthy	**Unhealthy**	**Healthy**	**Unhealthy**
Belgium*	0.46		0.49	
Denmark	0.45	0.48	0.49	0.53
Finland	0.42	0.54	0.50	0.54
Germany	0.44	0.42	0.51	0.45
Netherlands	0.38	0.40	0.49	0.53
Portugal*	0.44		0.55	
United Kingdom	0.42	0.53	0.48	0.53
Average	0.43	0.47	0.50	0.52

* No assesment of health status available

Source: Authors' calculations.

5. Incentives to retire

5.1 Replacement rates

Previous OECD work has established that retirement decisions can be strongly influenced by fiscal incentives (Blöndall and Scarpetta, 1998), which can be separated into two components. The first is the replacement rate — i.e. the pension received as a proportion of working income prior to retirement. The higher the replacement rate, the greater is the incentive to retire. The second component is the change in net pension wealth from working an additional year and so foregoing an extra year of pension and paying a further year of contributions. If as a result of working an extra year net pension wealth remains constant, then the system is neutral, but if it falls, then the system imposes an implicit tax on working.

In what follows we show option values for retirement at age 55. So any future retirement age is compared with the advantage of retiring at age 55. As long as option value is positive it is beneficial not to retire at age 55 compared with the particular year of retirement. The peak value of the option value shows the maximum benefit of not retiring today. Crossing the point of option value with the horizontal axis, which indicates age, shows a point of indifference between retiring now or at that particular age. In almost all of the pension systems, the option value starts to recede after pensionable age. This implies that it is less and less optimal in each successive year to postpone retirement from a financial point of view. The simple reason is that an implied higher pension level is more than offset by the fewer years left to draw the pension. A more comprehensive evaluation would calculate option value for every age. However, the point for highest option value is always close to pensionable age.

The slope of the option-value curve thereafter is insensitive to the evaluation point of year. The evaluation point affects only the amount income earned, since pension income is not paid before pensionable age.

Option values are calculated as an average of option values at three levels of income: 67% of average production worker, average production worker and 167% of average production worker. Moreover, incomes of women are adjusted for the lower average supply of work. Hence, wages for men and women are assumed to be the same and the lower income earnings of women are explained by lower labour supply.

Tables 13-16 show first the replacement rates for men and women. Appendix C also shows country-specific tables that include the pension wealth and changes in it as a share of earnings (a tax/subsidy effect) for all. The calculations exclude pensions from second and third pillars, i.e. private voluntary pensions. These are important – especially in the UK. However, in the calculations for the UK a basic state pension, £3471 a year for men over 65 and women over 60, is included (25% of workforce is covered by this).

The idea here is to show the replacement rate also before pensionable age, i.e. at an age when the individual is not yet entitled to a pension. The individual is assumed to have spent 25 years at work by age 55 so that replacement rates have not yet reached the upper bounds. Option values shown later only take into account pension wealth after pensionable age (i.e. the replacement rate is set at zero until pensionable age). However,

in most of the countries an early retirement scheme exists at age 55. This is usually at least as generous as an old-age pension. Replacement rates before pensionable age can, hence, be considered as lower bounds for replacement rates in early retirement schemes.

For each country the first column includes the effects of the value of domestic work and the second column excludes it. The bottom the first column shows net earnings and the second column the value of domestic work for each country. Last column shows the unweighted average of the figures over the countries.

Table 13. Replacement rates for men, extended with domestic work (total) and traditional (partial), healthy

Last year of work	Belgium*		Denmark		Finland, old		Finland, new		Germany		Netherlands		Portugal*		UK		Average	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	104 %	75 %	78 %	48 %	85 %	41 %	90 %	40 %	70 %	52 %	89 %	44 %	97 %	79 %	60 %	23 %	84 %	51 %
56	104 %	75 %	82 %	48 %	86 %	42 %	92 %	44 %	76 %	62 %	90 %	44 %	99 %	82 %	60 %	23 %	86 %	54 %
57	104 %	75 %	82 %	48 %	87 %	44 %	94 %	47 %	77 %	64 %	90 %	45 %	101 %	84 %	61 %	24 %	87 %	55 %
58	104 %	75 %	82 %	48 %	88 %	45 %	96 %	51 %	79 %	66 %	90 %	45 %	104 %	87 %	61 %	25 %	88 %	56 %
59	104 %	75 %	82 %	48 %	88 %	46 %	98 %	54 %	81 %	69 %	91 %	45 %	106 %	89 %	61 %	25 %	89 %	58 %
60	104 %	75 %	82 %	48 %	89 %	48 %	100 %	58 %	82 %	71 %	91 %	46 %	108 %	92 %	62 %	26 %	90 %	59 %
61	104 %	75 %	82 %	48 %	91 %	50 %	102 %	61 %	84 %	74 %	91 %	46 %	111 %	95 %	62 %	26 %	91 %	61 %
62	104 %	75 %	82 %	48 %	92 %	52 %	104 %	65 %	86 %	77 %	91 %	46 %	113 %	97 %	63 %	27 %	92 %	62 %
63	104 %	75 %	82 %	48 %	94 %	55 %	112 %	78 %	88 %	80 %	92 %	46 %	115 %	100 %	63 %	27 %	94 %	65 %
64	104 %	75 %	82 %	48 %	94 %	55 %	116 %	85 %	90 %	82 %	92 %	47 %	118 %	103 %	64 %	28 %	95 %	67 %
65	104 %	75 %	90 %	58 %	94 %	55 %	119 %	91 %	92 %	86 %	92 %	47 %	120 %	105 %	95 %	68 %	102 %	76 %
66	104 %	75 %	90 %	58 %	94 %	55 %	123 %	97 %	96 %	91 %	92 %	47 %	120 %	105 %	96 %	68 %	103 %	77 %
67	104 %	75 %	90 %	58 %	94 %	55 %	126 %	103 %	99 %	96 %	92 %	47 %	120 %	105 %	96 %	69 %	104 %	79 %
68	104 %	75 %	90 %	58 %	94 %	55 %	130 %	109 %	103 %	102 %	92 %	47 %	120 %	105 %	97 %	70 %	105 %	81 %
69	104 %	75 %	90 %	58 %	94 %	55 %	133 %	116 %	107 %	108 %	92 %	47 %	120 %	105 %	97 %	70 %	106 %	83 %
70	104 %	75 %	91 %	59 %	94 %	55 %	134 %	117 %	112 %	115 %	92 %	47 %	120 %	105 %	98 %	71 %	107 %	84 %
Average	104 %	75 %	85 %	52 %	91 %	50 %	111 %	76 %	89 %	81 %	91 %	46 %	112 %	96 %	75 %	42 %	95 %	67 %
	Y	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**
Employed	8.24	1.16	15.22	4.67	8.81	6.53	8.81	6.53	18.07	4.58	12.60	3.44	4.08	0.50	22.20	4.45	12.75	3.62
Retired	3.59	6.23	6.66	8.94	3.83	10.11	3.83	10.11	9.25	5.08	6.24	8.05	3.23	1.18	5.17	9.26	5.43	6.98

Total includes domestic work.Y=Net wages D=Net pensions in thousand euros

* No assessment of health status available

Source: Authors' calculations.

Table 14. Replacement rates for men, extended with domestic work (total) and traditional (partial), unhealthy

Last year of work	Denmark		Finland, old		Finland, new		Germany		Netherlands		UK		Average	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	65 %	48 %	84 %	41 %	89 %	40 %	78 %	52 %	80 %	44 %	50 %	23 %	74 %	41 %
56	65 %	48 %	85 %	42 %	91 %	44 %	85 %	62 %	80 %	44 %	50 %	23 %	76 %	44 %
57	65 %	48 %	86 %	44 %	93 %	47 %	86 %	64 %	80 %	45 %	50 %	24 %	77 %	45 %
58	65 %	48 %	87 %	45 %	95 %	51 %	88 %	66 %	81 %	45 %	51 %	25 %	78 %	46 %
59	65 %	48 %	88 %	46 %	97 %	54 %	90 %	69 %	81 %	45 %	51 %	25 %	79 %	48 %
60	65 %	48 %	88 %	48 %	99 %	58 %	92 %	71 %	81 %	46 %	52 %	26 %	79 %	49 %
61	65 %	48 %	90 %	50 %	101 %	61 %	93 %	74 %	81 %	46 %	52 %	26 %	80 %	51 %
62	65 %	48 %	91 %	52 %	103 %	65 %	95 %	77 %	82 %	46 %	53 %	27 %	81 %	52 %
63	65 %	48 %	93 %	55 %	110 %	78 %	97 %	80 %	82 %	46 %	53 %	27 %	83 %	56 %
64	65 %	48 %	93 %	55 %	113 %	85 %	100 %	82 %	82 %	47 %	54 %	28 %	84 %	57 %
65	73 %	58 %	93 %	55 %	117 %	91 %	102 %	86 %	82 %	47 %	83 %	68 %	92 %	67 %
66	73 %	58 %	93 %	55 %	120 %	97 %	106 %	91 %	82 %	47 %	84 %	68 %	93 %	69 %
67	73 %	58 %	93 %	55 %	124 %	103 %	109 %	96 %	82 %	47 %	84 %	69 %	94 %	71 %
68	73 %	58 %	93 %	55 %	127 %	109 %	114 %	102 %	82 %	47 %	85 %	70 %	96 %	73 %
69	73 %	58 %	93 %	55 %	130 %	116 %	118 %	108 %	82 %	47 %	85 %	70 %	97 %	76 %
70	74 %	59 %	93 %	55 %	131 %	117 %	123 %	115 %	82 %	47 %	86 %	71 %	98 %	77 %
Average	68 %	52 %	90 %	50 %	109 %	76 %	98 %	81 %	82 %	46 %	64 %	42 %	85 %	58 %
	Y	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**		
Employed	15.22	3.98	8.81	7.29	8.81	7.29	18.07	3.84	12.60	4.72	22.20	5.51	14.28	5.44
Retired	6.66	5.17	3.83	10.63	3.83	10.63	9.25	5.78	6.24	7.66	5.17	7.53	5.89	7.90

Total includes domestic work.Y=Net wages D=Net pensions in thousand euros

Source: Authors' calculations.

Table 15. Replacement rates for women, extended with domestic work (total) and traditional (partial), healthy

Last year of work	Belgium*		Denmark		Finland, old		Finland, new		Germany		Netherlands		Portugal*		UK		Average	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	137 %	86 %	78 %	56 %	97 %	39 %	100 %	36 %	60 %	55 %	90 %	39 %	103 %	77 %	62 %	21 %	90 %	53 %
56	137 %	86 %	78 %	56 %	97 %	40 %	102 %	39 %	66 %	65 %	90 %	39 %	104 %	80 %	63 %	22 %	91 %	55 %
57	137 %	86 %	78 %	56 %	98 %	42 %	103 %	42 %	67 %	67 %	90 %	39 %	106 %	83 %	63 %	22 %	92 %	57 %
58	137 %	86 %	78 %	56 %	98 %	43 %	104 %	46 %	68 %	70 %	90 %	39 %	108 %	85 %	63 %	23 %	93 %	58 %
59	137 %	86 %	78 %	56 %	99 %	44 %	105 %	49 %	70 %	72 %	90 %	39 %	110 %	88 %	64 %	23 %	93 %	59 %
60	137 %	86 %	78 %	56 %	99 %	46 %	107 %	52 %	71 %	75 %	90 %	39 %	112 %	90 %	64 %	24 %	94 %	60 %
61	137 %	86 %	78 %	56 %	100 %	48 %	108 %	55 %	73 %	78 %	90 %	39 %	114 %	93 %	95 %	63 %	99 %	67 %
62	137 %	86 %	78 %	56 %	101 %	50 %	109 %	58 %	75 %	81 %	90 %	39 %	115 %	95 %	96 %	64 %	100 %	69 %
63	137 %	86 %	78 %	56 %	102 %	52 %	114 %	71 %	76 %	84 %	90 %	39 %	117 %	98 %	96 %	64 %	101 %	71 %
64	137 %	86 %	78 %	56 %	102 %	52 %	116 %	76 %	78 %	87 %	90 %	39 %	119 %	101 %	96 %	65 %	102 %	73 %
65	137 %	86 %	86 %	68 %	102 %	52 %	118 %	82 %	80 %	90 %	90 %	39 %	121 %	103 %	97 %	73 %	104 %	77 %
66	137 %	86 %	86 %	68 %	102 %	52 %	121 %	87 %	83 %	96 %	90 %	39 %	121 %	103 %	97 %	74 %	105 %	79 %
67	137 %	86 %	86 %	69 %	102 %	52 %	123 %	93 %	86 %	101 %	90 %	39 %	121 %	103 %	97 %	74 %	106 %	81 %
68	137 %	86 %	86 %	69 %	102 %	52 %	125 %	99 %	90 %	108 %	90 %	39 %	121 %	103 %	98 %	75 %	107 %	83 %
69	137 %	86 %	86 %	69 %	102 %	52 %	127 %	104 %	94 %	114 %	90 %	39 %	121 %	103 %	98 %	75 %	108 %	84 %
70	137 %	86 %	64 %	54 %	102 %	52 %	128 %	106 %	97 %	121 %	90 %	39 %	121 %	103 %	98 %	76 %	105 %	84 %
Average	137 %	86 %	80 %	60 %	101 %	48 %	113 %	68 %	77 %	85 %	90 %	39 %	115 %	94 %	84 %	52 %	99 %	69 %
	Y	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**
Employed	6.63	1.75	13.05	6.55	8.74	11.06	7.21	11.06	11.86	8.14	8.39	7.76	3.22	2.18	16.61	7.34	9.57	6.40
Retired	5.47	5.81	6.70	8.04	3.39	15.62	3.56	10.11	6.46	5.56	2.99	11.12	3.23	1.18	3.52	10.89	4.56	7.53

Total includes domestic work.Y=Net wages D=Net pensions in thousand euros

* No assessment of health status available

Source: Authors' calculations.

Table 16. Replacement rates for women, extended with domestic work (total) and traditional (partial), wnhealthy

Last year of work	Denmark		Finland, old		Finland, new		Germany		Netherlands		UK		Average	
	Total	Partial	Total	Partial	Total	Partial	Total	Partial	Total	Partial	Total	Partial	**Total**	**Partial**
55	97 %	50 %	95 %	42 %	101 %	42 %	95 %	56 %	73 %	37 %	50 %	25 %	85 %	42 %
56	97 %	50 %	96 %	43 %	103 %	46 %	102 %	66 %	74 %	38 %	51 %	25 %	87 %	45 %
57	97 %	50 %	97 %	45 %	105 %	49 %	103 %	69 %	74 %	38 %	51 %	26 %	88 %	46 %
58	97 %	50 %	98 %	46 %	107 %	53 %	105 %	72 %	74 %	38 %	52 %	27 %	89 %	48 %
59	97 %	50 %	98 %	47 %	109 %	57 %	107 %	74 %	74 %	38 %	52 %	27 %	90 %	49 %
60	97 %	50 %	99 %	49 %	111 %	60 %	109 %	77 %	74 %	38 %	53 %	28 %	90 %	50 %
61	97 %	50 %	100 %	51 %	113 %	64 %	111 %	80 %	74 %	38 %	79 %	56 %	96 %	57 %
62	97 %	50 %	102 %	53 %	115 %	68 %	113 %	83 %	74 %	38 %	79 %	57 %	97 %	58 %
63	97 %	50 %	103 %	56 %	122 %	82 %	115 %	86 %	74 %	38 %	80 %	57 %	98 %	62 %
64	97 %	50 %	103 %	56 %	125 %	89 %	117 %	89 %	74 %	38 %	80 %	58 %	99 %	63 %
65	104 %	61 %	103 %	56 %	128 %	95 %	120 %	92 %	74 %	38 %	81 %	67 %	102 %	68 %
66	104 %	61 %	103 %	56 %	132 %	102 %	123 %	98 %	74 %	38 %	81 %	67 %	103 %	70 %
67	105 %	62 %	103 %	56 %	135 %	108 %	128 %	104 %	74 %	38 %	82 %	68 %	104 %	73 %
68	105 %	62 %	103 %	56 %	138 %	115 %	132 %	110 %	74 %	38 %	82 %	69 %	106 %	75 %
69	105 %	62 %	103 %	56 %	142 %	121 %	136 %	117 %	74 %	38 %	83 %	69 %	107 %	77 %
70	78 %	48 %	103 %	56 %	143 %	123 %	141 %	124 %	74 %	38 %	83 %	70 %	104 %	76 %
Average	98 %	53 %	101 %	51 %	121 %	80 %	116 %	87 %	74 %	38 %	70 %	50 %	97 %	60 %
	Y	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**	**Y**	**D**		
Employed	14.56	7.36	12.15	9.28	9.47	9.28	11.03	4.47	8.66	9.85	23.17	6.31	13.17	7.76
Retired	6.67	13.93	5.29	14.92	3.56	10.63	6.16	8.32	2.99	10.25	5.97	8.35	5.11	11.07

Total includes domestic work.Y=Net wages D=Net pensions in thousand euros

Source: Authors' calculations.

5.1.1 Individuals in good health

The bottom figures in the last column of Tables 13 and 15 show that the value of domestic work is on average one-third of net earnings for men and two-thirds of net earnings for women while at work. However, in the replacement rate calculations and especially in option values the difference in levels (20% higher value of domestic work for women than for men) is not that important compared with the changes in domestic work before and after withdrawal from work. Table 16 shows that for men the value of domestic work almost doubles after retirement. Men tend to change their non-work time allocation towards domestic work more than women after retirement. Men also start with ten hours less weekly domestic work while still working.

The average replacement rate over 55-70 years is 40% higher for men and 45% higher for women when taking into account the value of domestic work. Hence, replacement rates are much higher with the inclusion of domestic work. Domestic work increases the replacement rate, since in all countries, irrespective of gender, there is some addition to domestic work after withdrawal from work. The replacement rate is on average close to 100% when domestic work is accounted for.

Replacement rates on average increase relatively more for women after the inclusion of domestic work. The average replacement rate in ages from 55 to 70 is 99% as compared with 69% when domestic work excluded (Table 13, last column). For men the replacement rate increases from 67% to 95% (Table 15, last column). After retirement the relative value of domestic work exceeds annual pension income for both genders. Hence, it is obvious that incentives to retire are on average very high, since no net economic gain is achieved when continuing to work. It should also be remembered that before pensionable age early retirement schemes are usually even more generous than what the old-age pension scheme would imply.

The average replacement rate with the exclusion of domestic work is 67-69%. It is evident that average replacement rates are slightly lower for men than for women with the exclusion of domestic work (the difference is small). Replacement rates, hence, tend to somewhat decrease with the higher income levels. It should be recalled that the income of women is corrected for the average 25% fewer working hours.

Despite the consequent higher replacement rate for women, the option value calculations in the next section reveal that the valuation of domestic work makes it more attractive for men to retire. The relatively greater increase in domestic work after withdrawal from work explains this.

5.1.2 Individuals in poor health

Here, it is worth considering full replacement rates. For men, the average of replacement rates across the countries is 85% for the unhealthy instead of 90% for healthy. The replacement rates are higher for men in good health than in poor health in all countries except for Germany. By contrast, for women, individuals with poor health have a higher replacement rate (97%) than the healthy (89%) (excluding the old system in Finland). As discussed, the reason is either the relatively high labour supply of

women in poor health, as in Denmark and Finland, or the high domestic work supply of non-employed women in poor health in all countries (strikingly so in Denmark, Finland and the Netherlands). Correspondingly, the highest replacement rates for women in poor health are found for Denmark, Finland and Germany.

5.2 Option values for retirement

Consider next the path of option values with and without domestic work for each country separately. The figures are closely similar to those for healthy persons. Domestic work has two effects on option value. To begin with, the replacement rate is higher as shown above. This explains why pension wealth is higher when domestic work is included. Second, domestic work also affects the relative value of continuing to work because of foregone domestic work. This explains why the accumulation of total income is lower before the pensionable age. One can think of this as an additional payment to a housekeeper to maintain the required level of services. In addition, the health status affects time use on household work and thus has an effect on the incentive to retire. It is expected that the unhealthy supply less household work than the healthy and that they increase their supply by less after withdrawal from the labour market. Thus the option values are expected to be higher for unhealthy persons because both the replacement rate and the value of foregone domestic work are lower for them. Figures 1 through 12 present graphically the option values for healthy and unhealthy persons, except for Belgium and Portugal, where information on health status are not available and the incentive calculations are performed for the whole sample. The option values are presented in thousands of euros, *total* referring to option values inclusive of household work and *partial* to option values only considering paid work.

Tables 17 and 18 present the yearly earnings and the value of domestic work while employed and in retirement. These figures, together with the replacement rates and option values allow a more detailed comparison of retirement incentives in different pension systems.

Table 17. Yearly earnings and the value of domestic work by employments status and health, men

Earnings and value of domestic work, men

	Denmark				**Finland**				**Germany**			
	Good		**Poor**		**Good**		**Poor**		**Good**		**Poor**	
	Y	D	Y	D	Y	D	Y	D	Y	D	Y	D
Employed	15.22	4.67	15.22	3.98	8.65	6.53	8.65	7.29	18.07	4.58	18.07	3.84
Retired	6.66	8.94	6.66	5.17	3.56	10.11	3.56	10.63	9.25	5.08	9.25	5.78
	Netherlands				**UK**				**Average**			
	Good		**Poor**		**Good**		**Poor**		**Good**		**Poor**	
	Y	D	Y	D	Y	D	Y	D	Y	D	Y	D
Employed	12.60	3.44	12.60	4.72	22.20	4.45	22.20	5.51	17.53	4.07	17.53	4.86
Retired	6.24	8.05	6.24	7.66	5.17	9.26	5.17	7.53	6.41	7.94	6.41	7.23

Y= Wages (employed) or pensions (retired), D= Value of domestic work, thousands €

Source: Authors' calculations.

Table 18. Yearly earnings and the value of domestic work by employments status and health, women

	Denmark				Finland				Germany			
	Good		Poor		Good		Poor		Good		Poor	
	Y	D	Y	D	Y	D	Y	D	Y	D	Y	D
Employed	13.05	6.55	14.56	7.36	7.21	11.06	9.47	9.28	11.86	8.14	11.03	5.19
Retired	6.70	8.04	6.67	13.93	3.56	15.62	4.08	14.92	6.46	5.56	6.16	8.32
	Netherlands				**UK**				**Average**			
	Good		Poor		Good		Poor		Good		Poor	
	Y	D	Y	D	Y	D	Y	D	Y	D	Y	D
Employed	8.39	7.76	8.66	9.85	16.61	7.34	23.17	6.31	12.37	7.67	14.94	7.50
Retired	2.99	11.12	2.99	10.25	3.52	10.89	5.97	8.35	3.90	9.92	4.82	9.10

Y= Wages (employed) or pensions (retired), D= Value of domestic work, thousands €

Source: Authors' calculations.

Figure 2 shows the option values in good and poor health in thousands of euros in each country.

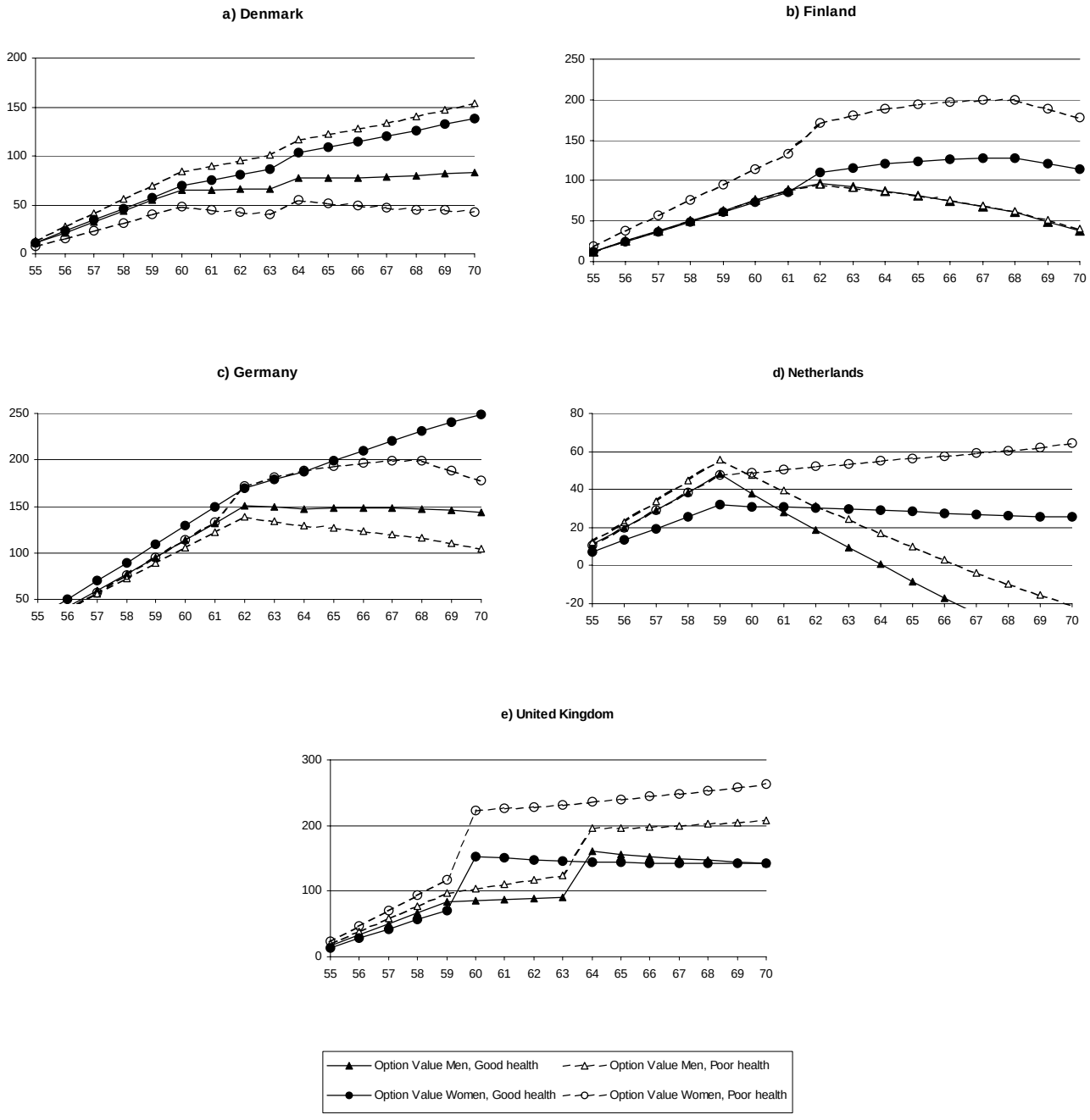
Figure 2 shows that healthy men are inclined to retire earlier in Denmark, the Netherlands and the UK as the time-use allocation implies. In Finland, the domestic work of men is relatively the same irrespective of health status. The lower labour supply for men in poor health does not alter the replacement rate by enough to have a large effect. In Germany, the higher supply of domestic work of men with poor health explains the greater incentive for those with poor health to retire.

Figure 2 reveals that women in poor health are inclined to retire early in Denmark and to some extent in Germany, as implied by the relatively high replacement rates in all countries. In Finland and the Netherlands the curves for unhealthy women are above the ones for healthy women despite the very high supply of household work when non-employed. In Finland the explanation is that the labour supply of women with poor health is the highest. Since the new Finnish pension system considered here offers very high incentives for the postponement of retirement (an accrual rate of 4.5 beyond age 63 and a deduction of accrual by 7 if retiring before 62) the high-income women with poor wealth are encouraged to continue to work later. As clearly remarked before, the labour supply prediction for Finland seems to be a bit distorted and women with poor health actually supply less paid work. Hence, this conclusion is not very decisive but rather shows the sensitivity of the fiscal incentive to the level of income. In the Netherlands, the labour supply of women in poor health is, in contrast, exceptionally low. Thus women with poor health are more likely to receive the lower, flat pension and not 70% of the wage level before retirement as when the income level is high enough. The replacement rate is low and therefore also the pension wealth accruals are low.

One of the major conclusions made earlier is that the level of the replacement rate is important. Yet the level of option values did not predict the average age of retirement well, although the implied optimal retirement age is an important predictor of retirement. This leads us to believe that the retirement incentives are still stronger for

women in poor health if the replacement rate is higher, even if option values do not indicate this.

Figure 2. Option values in thousands euros by health status

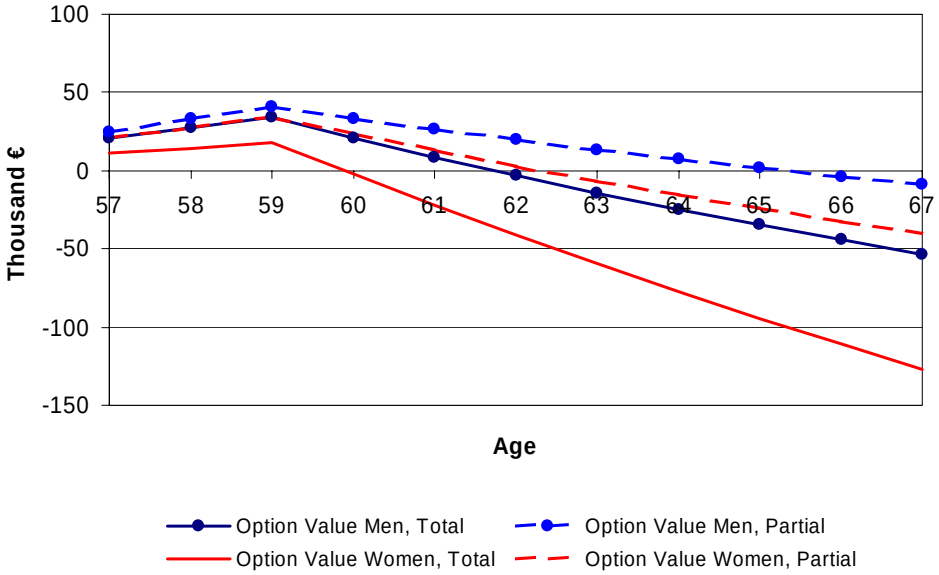


5.3 Country-specific analysis

Belgium. The eligibility requirements for early retirement social-security benefits were raised in 1997 from a minimum contributory career of 20 years up to 35 years in 2005 (European Commission, 2002). The age at which private sector workers can receive an occupational pension was raised to 60 in 2002; previously it had been in the 50s (Reid, 2002).

The additional domestic work after withdrawal from work is estimated to be worth €1,500 a year for men and €3,200 a year for women. Exclusion of domestic work yields replacement rates comparable to those shown in Gruber and Wise (1999) (see Appendix). It is noteworthy that the somewhat lower replacement rates here are explained by the social security payments of employers that are assumed to lower the gross wage and, hence, pension income. In their estimate as in OECD calculations, the social security payments of employers are perceived to have no impact on the formation of gross wages.

Figure 3. Option values at 55 years of age, Belgium



It is evident that incentives to accumulate pension wealth are low and optimal retirement age (the intersection point to the zero line) is achieved at age 60 for women and age 62 for men. Individuals are, hence, indifferent between retiring at age 55 or at this age. Both the low accumulation of wealth and low optimal retirement can explain the average age of withdrawal from the labour force of 59 years. Replacement rates are 95% for men and 125% for women (Tables 16 and 17). These are almost two-times higher than with no household income. Incentives to retire are strong after the pensionable age of 60. The omission of the value of domestic work postpones the optimal path for retirement by around two years (Figure 3).

Denmark. In Denmark, the universal flat-rate old-age pension benefit, which is financed from general tax revenues, is available at age 65. The minimum age for receipt of tax-favoured pension benefits is age 67, but other programmes facilitate early retirement. A private pension scheme gradually overtakes the flat public pension system described above. Currently, roughly one half of workers are in the new system. In both old and new systems pensions independent of the income levels appears to have helped Denmark with the expected demographic transition in the coming years.

The pre-early retirement plan, which provided a transitional benefit for people aged 50-59 who had become unemployed and had contributed to the unemployment benefit programme for at least 30 years, was closed to new entrants in 1996 and will be fully phased out by 2006 (as assumed here, see European Commission, 2002). Legislated in 1992, but starting in 2018, the pensionable age for women, which is age 56.6, will be increased to that of men, which is age 61.5. The change will occur stepwise until it is completed in 2034. In our calculations pensionable age is set at 61 years for both sexes.

In Denmark, the change in domestic work after retirement is average, worth around €4,300 for healthy men and €1,500 for healthy women. Among the unhealthy, the increase is €1,700 for men and a very high €6,600 for women. Thus the unhealthy non-employed women supply the most household work in Denmark, and it is not surprising that health status has the opposite effect on the added income from domestic work for men and women. The unhealthy also, surprisingly, supply more paid work than the healthy. This explains the difference in the option-value curves for the healthy and the unhealthy (Figures 4 and 5).

Figure 4. Option values at 55 years of age, Denmark, healthy

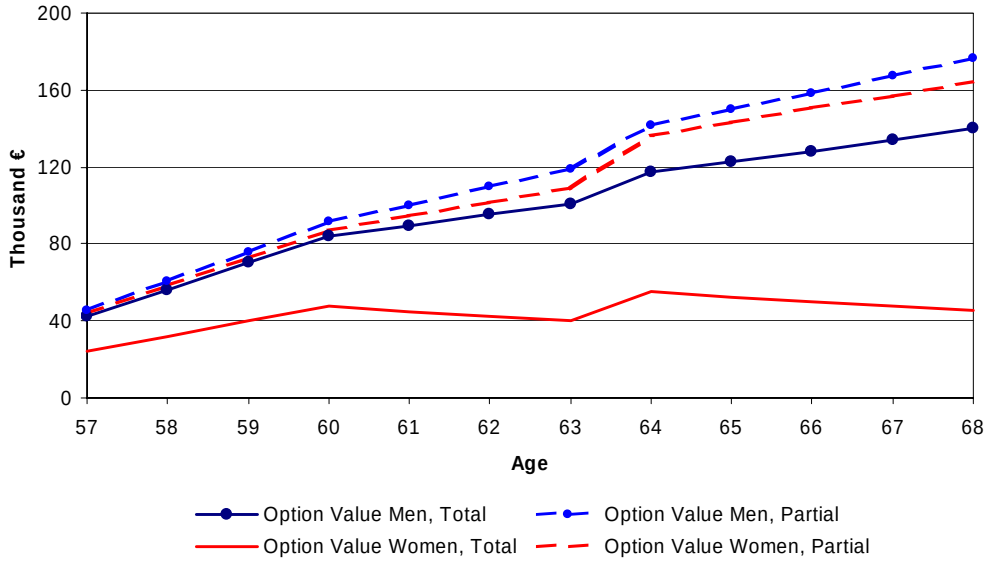
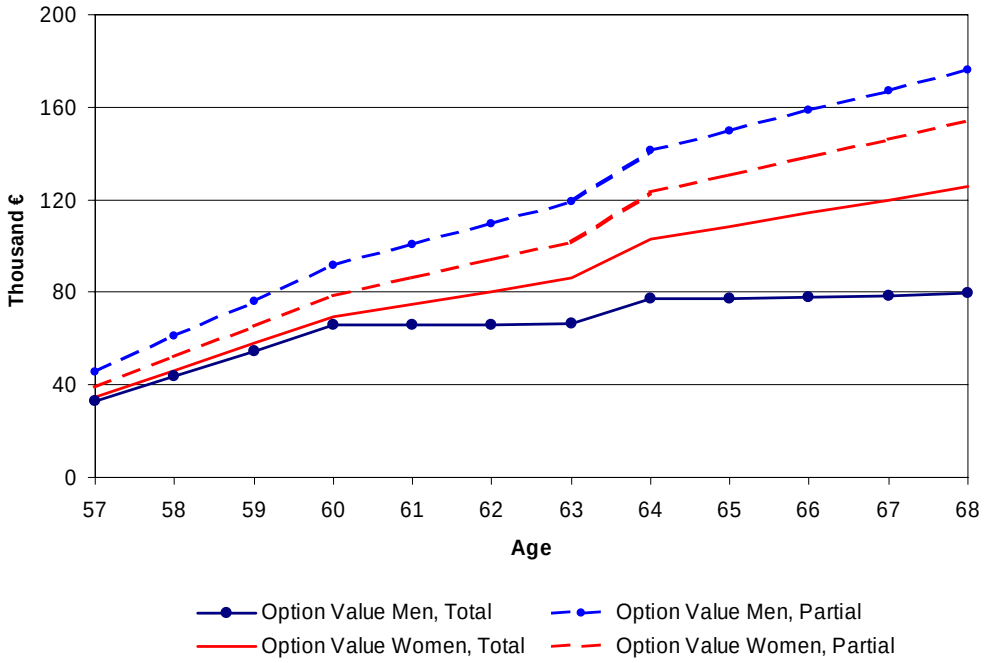


Figure 5. Option values at 55 years of age, Denmark, unhealthy



In Denmark, the unhealthy supply more paid work than the healthy. The non-employed perform more household work than the employed, women more than men. Among men, the healthy seem to increase their supply of household work by more than the unhealthy, while the opposite is true for women. In fact, the unhealthy non-employed women supply the most household work in Denmark. This explains the difference in the option-value curves for the healthy and the unhealthy: while the incentive to keep working is the lowest for men among the healthy, women take this place when the unhealthy are considered.

The average retirement age is 62.4 years for men and 61.5 years for women. This later average age of retirement than in other countries can be explained by the public pension system, which encourages postponement of withdrawal from work. The replacement rates are lower than in other countries before the legal age of retirement of 65 years (63% for men and 77% for women). It is clearly more optimal to retire at the age of 68 than at the age of 61 despite the shorter than average life expectancy in Denmark. Thus in economic terms optimal retirement age is beyond 68 years. The system also includes possibilities for additional pension income if retirement is postponed until 68 years of age. In fact, calculations presume the possibility to work indefinitely and thereby it becomes optimal never to retire. The incentives to keep working are the lowest for men among the healthy and for women among the unhealthy. For women, their poor health status might also serve as a triggering factor in the retirement decision. They may decide to stop working in order to be able increase their household work. This is shown to be the case in continental Europe, too.

Finland. A new system has been launched to gradually start affecting pensions in 2005. Pension accrual starts at age 18 and is based on the whole working career and not on the ten last years of each employment relationship. Accrual is 1.5 before 53, 1.9 at ages 53-62 and 4.5 at ages 63-68. The new system is partly financed by an increase in the social security payments of employees, by 30% from age 54 onwards. The unemployment pipeline at age 60 enables still-effective retirement at 60 years. Here, the pensionable age is set at 62 years. The new system also allows the pension level to be corrected for changes in life expectancies, which are not taken into account here.

It is noteworthy that domestic work has an important effect of lowering option values and especially so for men. The increase of domestic work after withdrawal from work is by 10 hours for men and 13 hours for women but from relatively a low starting level for men.

In Finland, the marginal value of domestic work is also one of the highest as the hourly net wage is €7.8. In Finland, the difference between net-earned income and pension income is around €5,000 after retirement. This is almost totally compensated by an equal increase in the value of domestic work. Thus, it is not surprising that the curves for optimal retirement differ widely depending on the value of domestic work. The value of extra domestic work after retirement is €3,600 (€3,300) for men and €4,600 (€5,600) among the healthy (unhealthy) (Figures 6 and 7).

Figure 6. Option values at 55 years of age, Finland, healthy

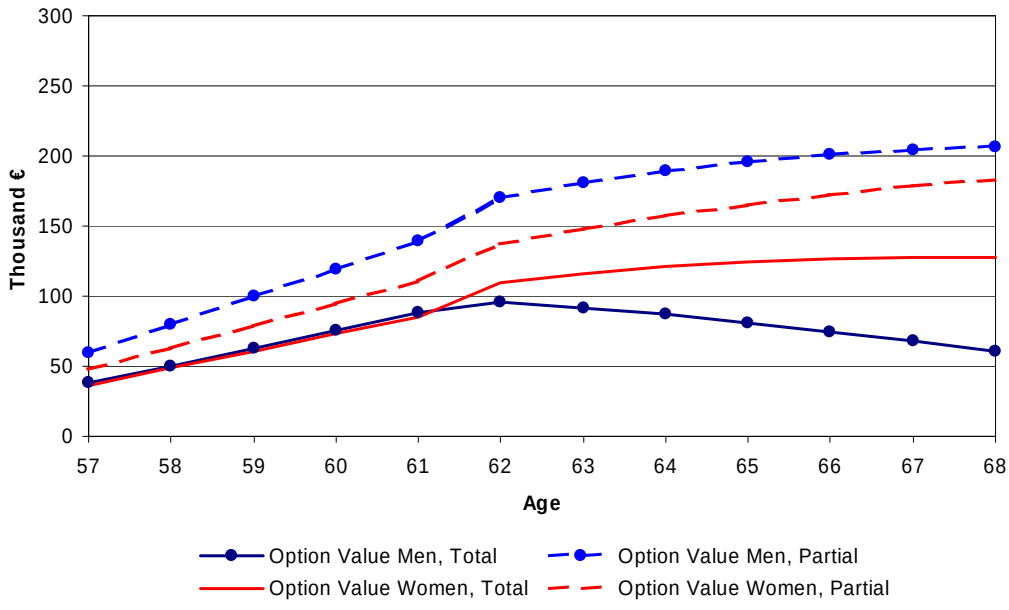
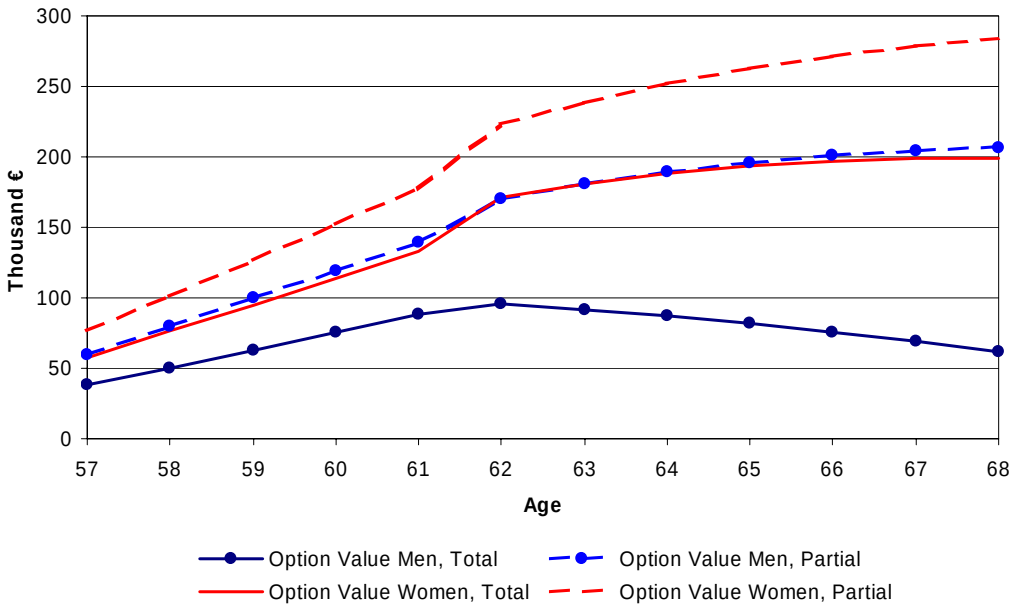


Figure 7. Option values at 55 years of age, Finland, unhealthy



The retirement incentives are weaker for unhealthy women because they supply less household work in absolute terms and do more paid work while in working life. It is optimal for men to postpone retirement to 68 years of age compared with retiring at age 55. This would also be true with the inclusion of the unemployment pension pipeline although incentives would be higher for early retirement. The incentives based on a high accrual rate of 7.5% from ages 62 to 63 and 4.5% per year from ages 63 to 68 keep the curve for the option value relatively flat. Thus, individuals are rather indifferent as to whether to retire at age 62 or at age 68 and this is especially so for women.

It seems that the new pension scheme is relatively successful in mitigating the decrease in pension wealth after pensionable age. On the other hand, the pension wealth at age 62 years is approximately €13,000 higher for men and €14,800 for women in the new system to take place in 2005 compared with the current one, as replacement rates are 5 percentage points higher (including domestic work). It is by no means clear that individuals are planning to retire later since the initial level of pension wealth also tends to be higher. Piekkola and Harmoinen (2003) show that the level of replacement rate/pension wealth as such is a very important determinant of retirement.

The OECD (2003) country report has also evaluated the Finnish pension reforms, which lead both to higher replacement rates and to less negative pension-wealth accrual at age 62. The study suggests that for a worker in his or her early 60s the implied less rapid decrease in pension wealth accrual from continuing to work for an additional year will be among the most favourable of the 15 OECD countries considered. The study, however, stresses the importance of studying alternative routes retirement. OECD considers the net effects on the incentives to retire difficult to judge.

One important issue is indeed whether the employee can use the option for unemployment benefits at age 60. It is well recorded, as in Gruber and Wise (1999) for

example, that the abolition of other early retirement schemes have resulted into an enhanced use of unemployment (pension) pipelines in other countries. The OECD study assumes that in the new Finnish system individuals cannot withdraw from the workforce before the age of 62. However, in the new system it is agreed that unemployed persons from age 60 are also entitled to pension accrual at the high rate 1.9 until the shift to old-age pension at age 62 (before that one can draw unemployment benefits for 500 days). This route remains an attractive alternative both for employers and employees. Social security wealth is for the average man €17,000 higher at age 60 in the new system with an option for unemployment benefits than in the old system. The actual social security wealth can even be higher because in the new system pensions start to accumulate at the age of 18 instead of 23 and additional periods of non-employment, such as those devoted to education or care of children accumulate pension levels.

It should be noted that in Finland early retirement is very common, also as an aftermath of the deep recession in 1992-94 that pushed a large share of the older workers out of work. This explains why the average age of retirement is one of the lowest and close to 60 years both for men and women. The figures drawn for the case, where unemployment benefits are taken into account, retains the incentives effectively to the same degree.

The time-use patterns and their effects on the option values are similar to those in Denmark. For unhealthy women, however, the retirement incentives are weaker than for their healthy counterparts because they supply less household work in absolute terms, although the increase after retirement is larger for them. In addition to the possible interpretations presented in the Danish case, it is also possible that those with poor health are not able to allocate the extra time towards other activities but are confined to the house and thus spend more time on household work.

Germany. In Germany, workers could retire at age 60, 63 or 65, depending on meeting certain qualifying conditions.[3] Legislation passed in 1989 and effective in 1992 stipulated an increase of the pensionable age from 60 for women and from 63 for men to 65 for both, starting in 2001. Pensionable age is taken as age 63 for both sexes. Old-age pension benefits depend on three factors: earnings points, pension factors and pension value. Earnings points are annual earnings divided by the average earnings of all contributors. Pension factor is one but includes an added factor for postponed retirement after 65. Pension value is the monthly benefit amount for one year's average covered earnings.

In Germany, as in other countries, workers lose approximately half of their net incomes from earnings after retirement. Household work does not substantially increase after retirement, only by a worth of €500 (€1,900) for healthy (unhealthy) men and €2,600 (€3,100) for healthy (unhealthy) women (the evaluation uses the time-use survey from 1991). This explains the closeness of the option values with or without domestic work (Figures 8 and 9). The replacement rate of pensions in 2000 at age 62 is (by authorities) calculated to be 70.8% with an average annual pension

[3] See www.bfa.de for a general description of the pension system

of €17,457 (Federal Statistical Office of Germany; Federal Ministry of Labour). In our calculations, the average replacement rate is somewhat higher: 77%-79% at age 62 or around 10 percentage points higher including domestic work. It is evident that without taking into account the unemployment pension pipeline, the German system can encourage the postponement of retirement until 65 years of age or beyond for women. The major factor is encouraging people to work until the age of 63, as individuals cannot draw any pension income earlier, thus 63 is also the pensionable age assumed here. As an economic incentive, retirement can occur at any time between 62 or 67 years for men, and is postponed for women who gain least from additional household income. The reason for the postponement of retirement is the deduction of pensions by 3.6% per year if retirement occurs before 65 and an addition is made to pensions at 6% per year if retirement is postponed.

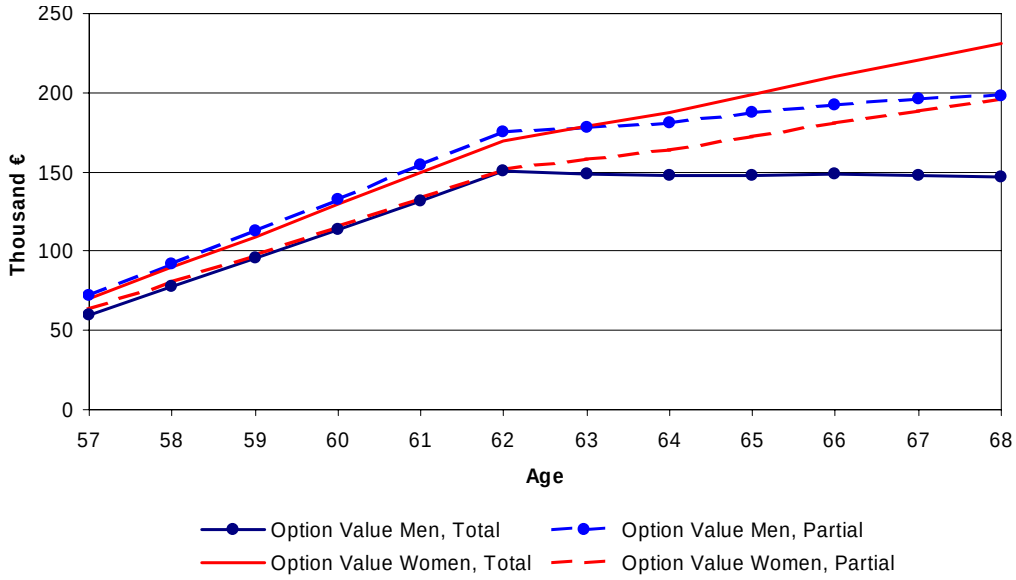


Figure 8. Option values at 55 years of age, Germany, healthy

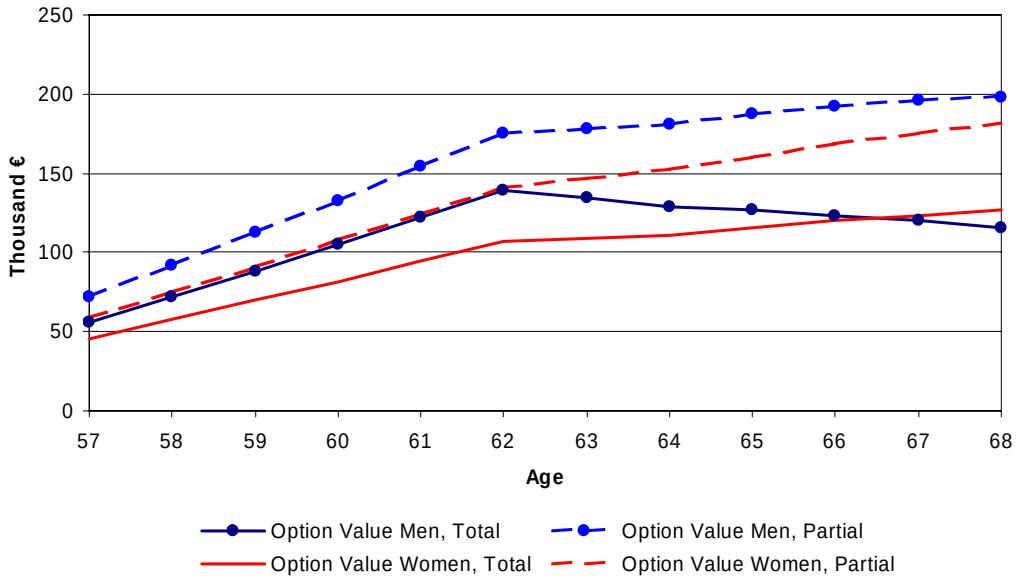


Figure 9. Option values at 55 years of age, Germany, unhealthy

The Netherlands. In the Netherlands, the basic social security old age pension is available at age 65. However, the early retirement VUT programme was developed in the early 1980s as a way to allow earlier retirement. With at least 10 years of uninterrupted employment, a worker at age 60 could retire with a very high replacement rate. The government plans to gradually phase out the present system. In our calculations it is assumed that the pensionable age is 60. At middle incomes and above the replacement rate is set at 70%. For the low incomes of 67% of that of an average production worker it is assumed that the public flat pension rate is more favourable.

In the Netherlands, the value for additional household work after retirement among the healthy is €4,600 for men and €3,400 for women. For the unhealthy, the increase in domestic work is small, yielding extra pension income worth only €2,900 for men and €400 for women. The public pension system with a flat pension implies a low replacement rate of around 90% (46% for men and 39% for women when domestic work is excluded). For the unhealthy, the total replacement rates are lower. It is clear that incentives to retire are relatively low for low-income earners, especially for women who are assumed to draw pensions from the public system rather than choosing 70% of incomes also at average incomes. Optimal retirement age is close to the pensionable age. It is seen that the age limit of 60 years inhibits earlier retirement, albeit the disability pension scheme is often available at earlier age.

The total option value reaches zero for healthy men at age 64, while in the case of unhealthy men it is pushed up to 66.5 years. The peak occurs at 59 for both. Otherwise, health has little effect on the retirement incentives of the Dutch, and their time-use patterns with respect to health and labour force status are fairly consistent with the hypotheses of the healthy performing more work, both paid and unpaid, and people increasing their supply of household work after retirement (Figures 10 and 11).

Figure 10. Option values at 55 years of age, the Netherlands, healthy

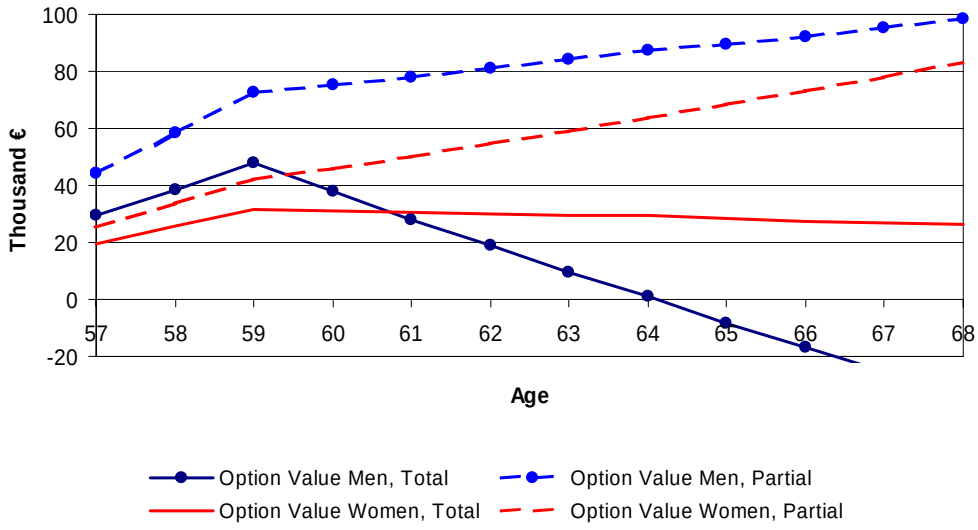
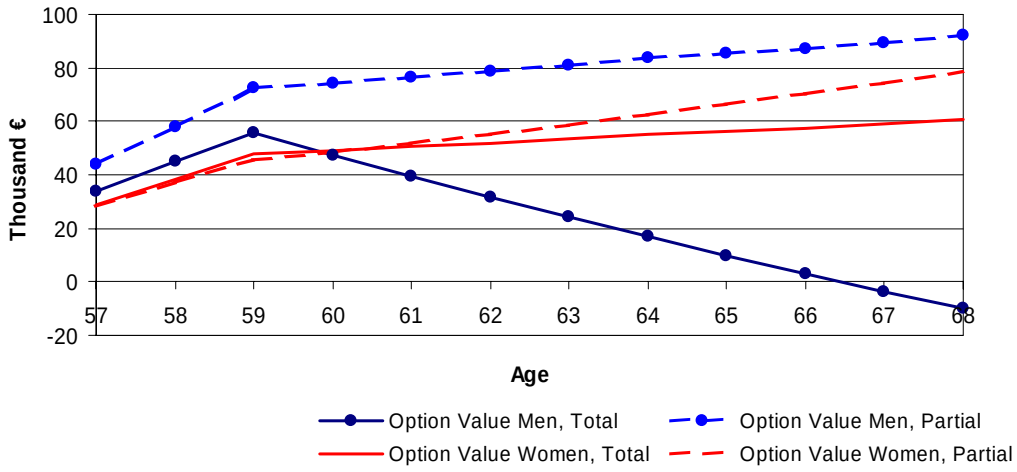
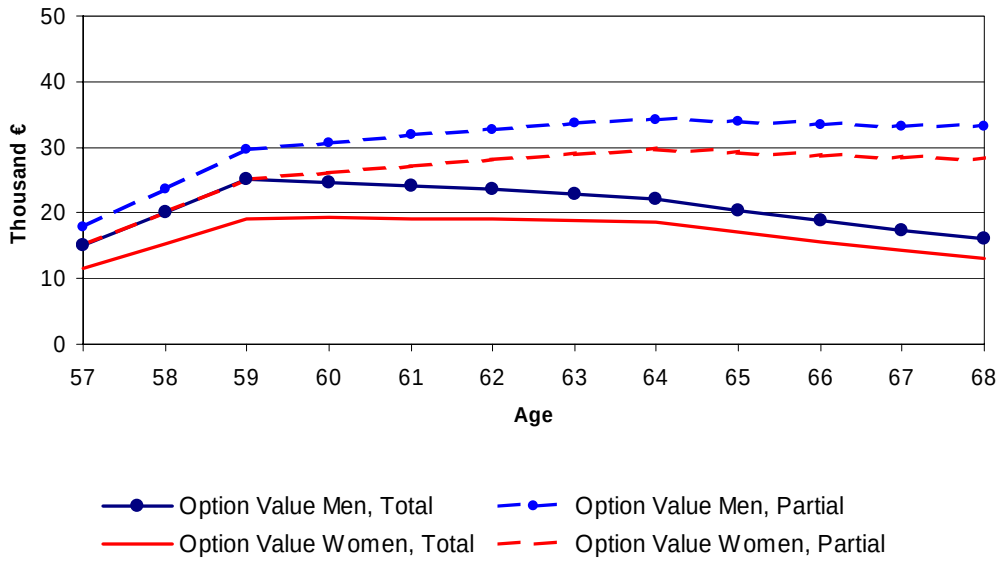


Figure 11. Option values at 55 years of age, the Netherlands, unhealthy



Portugal. Portugal has raised the pensionable age for women from 62 to 65 over the period 1994-99. In reality, the early retirement scheme enables retirement at age 62,



which is assumed here.

Figure 12. Option value at 55 years of age, Portugal

In Portugal the replacement rate is one of the highest, exceeding unity at age 63 even without domestic work. Domestic work is additionally greatly increased after withdrawal from work. On the other hand, the hourly value of domestic work (€1.5) is very low compared with the average (€5) for all countries. The wage rate applied here is

the mandatory minimum wage for domestic services, which may be lower than actual wages paid to domestic help. The additional domestic work after withdrawal from work is worth €680 for men and €1,100 for women. The overall result is that the individual has an incentive to continue to work throughout the working career, since the expected value for additional domestic work after retirement remains low. These findings fit well with the average later withdrawal at 66 years of age (Figure 12).

The UK. The pensionable age is currently 65 for men and 60 for women. As a result of legislation passed in 1995, it will be gradually raised for women over a 10-year period, starting in 2010 for women who reach age 60 that year, until it is equalised for all in 2020 at age 65 (O'Connell, 2002). In our calculations we have assumed pensionable age at 60 years owing to various early retirement arrangements leading to average retirement at 62 years for men and 61 years for women.

In the UK, the value of additional household work after retirement is €4800 for men and €3600 for women among the healthy, while among the unhealthy the increase in domestic work supply is worth €2000 both for men and women. In the UK, we are only considering the State Earnings Related Pension Scheme (SERPS), by which about 25% of the labour force is covered. Private pension schemes constitute over half of total income in retirement in the UK (Gruber and Wise, 1999, p. 415). SERPS is currently going through a remodelling, where the original target replacement rate of 25% of the average earnings during the best 20 years is gradually changed to 20% of the lifetime average. The pension accrual rates are determined according to these target replacements, and here we assume the accrual rate under the new scheme.

It is evident in Figures 13 and 14 that the low replacement rates, 71% for men and 81% for women, guarantee incentives to postpone retirement. At the low level of any tax difference, an individual is relatively indifferent with the timing of optimal retirement given the pensionable age of 60 for women and 65 for men. The effect of health status on option values comes from the smaller increase of household work in non-employment spells, as the UK also represents the 'normal' time use with respect to health and labour force participation: the non-employed supply more household work and the healthy increase their supply by more than the unhealthy, and this results in a mere level effect of health status on option values.

Figure 13. Option values at 55 years of age, the UK, healthy

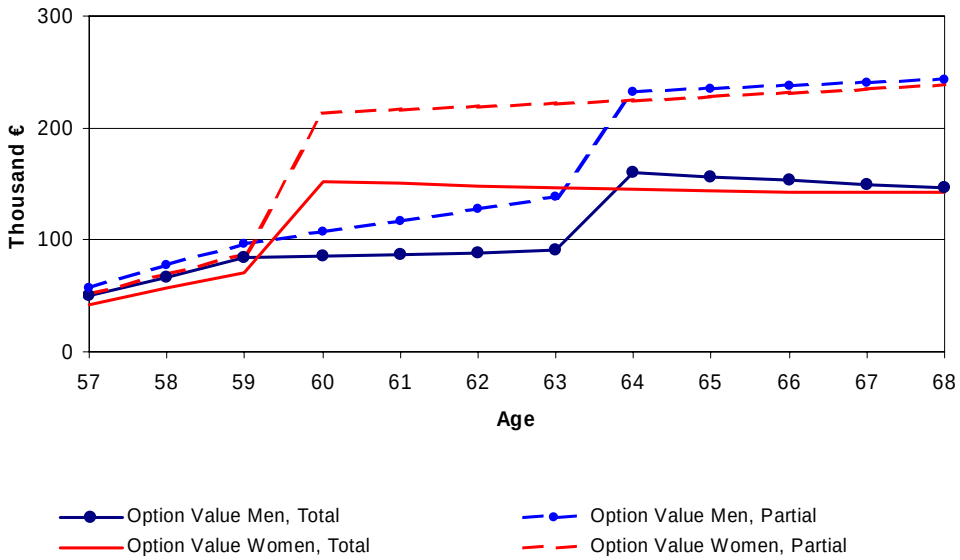
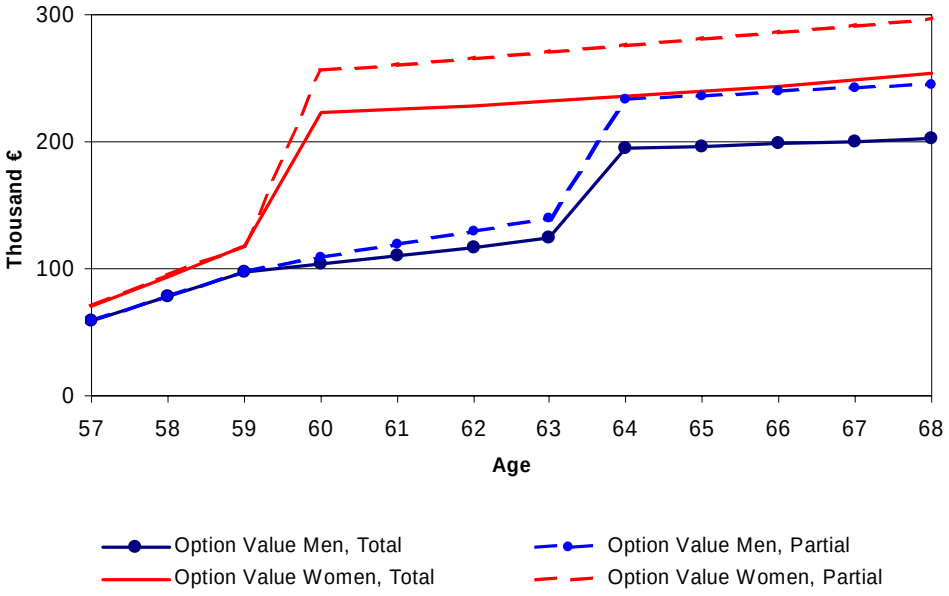


Figure 14. Option values at 55 years of age, the UK, unhealthy



6. Basic results

6.1 Regional differences in lifetime total work

We first approach the question of whether the allocation of working time between the workplace, home and retirement schemes exhibit any dissimilarities among the countries that can potentially cause differences in retirement behaviour. Before drawing conclusions, a measure of dissimilarity between pairs of countries with respect to the time-use pattern is used.[4] This is done only for healthy persons, since the figures are most reliable for them. The measure is based on the Euclidean Distance, which describes the distance between two vector points in metric space (Chiang, 1984, p. 73). A similar method has been applied to examining differences in time use by Szalai (1972) and Harvey (1989). The measures of dissimilarity in Table 18 are the square roots of squared differences in the mean weekly hours of paid and household work by employed men and women in pairs of countries. First, the hours of paid work and household work in one country is subtracted from the hours in another for all country pairs, separately for men and women. Then the same is repeated for household work. The smaller the difference in the measure of dissimilarity between two countries, the more similarity there is between the pair of countries. Respectively, a higher value indicates more dissimilarity. The matrix resembles a correlation matrix in the sense that each country is compared to every

[4] Here $D = \sqrt{\sum_{i=1}^{k} (a_1 - a_2)^2}$, Szalai and Converse applied the measure to the proportions of different time use categories out of total time (Szalai, 1972, p. 142).

other country and that the measure of dissimilarity provides information on the relationship between the two.

Table 19 reveals some differences among the countries, as was seen in the previous section. Since four time-use factors are included (paid work by men, paid work by women, household work by men and household work by women), the measure expresses the overall dissimilarity instead of differences in just one time-use category at a time, which is the case with Tables 10-12 in the previous section 4.2. If the welfare-regime typology were an appropriate classification of these countries with respect to time use in paid and household work, the countries that belong to the same regime should result in a low value when compared with other countries in the regime.

Table 19. Measures of dissimilarity (D) between pairs of countries in weekly hours of paid and household work by employed men and women (healthy)

	Den	**Fin**	**Bel**	**Ger**	**NL**	**Por**	**UK**	**AVG**
Den	0.00							
Fin	7.98	0.00						
Bel	3.42	11.13	0.00					
Ger	8.76	8.26	11.66	0.00				
NL	7.52	4.19	10.05	9.87	0.00			
Por	10.52	7.97	11.82	14.72	6.83	0.00		
UK	9.94	7.72	11.42	15.17	7.16	5.76	0.00	
AVG	4.96	3.76	7.70	8.79	3.41	6.67	6.84	0.00

Source: Authors' calculations.

Denmark has the most similarity to Belgium, the Netherlands and Finland. The low level of dissimilarity with Finland is expected to be based on the welfare-regime typology, but the low supply of household work in both countries explain the similarity to Belgium and while the gender allocation of work is very similar in Denmark and the Netherlands.

Finland has the greatest similarity to the Netherlands and partly to Portugal and the UK. The UK has the greatest similarity to Portugal, with the Netherlands and Finland following. All these countries can be characterised by relatively long hours of paid work. A second look at Tables 10, 12 and 13 also confirms that time use in household work and the total work hours, especially for women, are similar except for domestic work in Portugal.

Among the continental countries Germany has dissimilarity measures indicating that it has the most in common with the Nordic countries and the least with the UK. Together with Finland and the Netherlands, Germany has the highest value when compared to Belgium, which in turn exhibits relatively high values on all comparisons. The UK and Portugal are the most dissimilar to both Germany and Belgium. The continental regime seems to contain countries with similar time-use patterns, but small countries such as the Netherlands are exceptions.

The overall picture this exercise gives seems to indicate that time-use patterns follow the welfare-regime typology in a general sense. There seem to be two groups of

countries exhibiting mutual similarity: that of the UK and Portugal with Finland and the Netherlands on the one hand, and a group where Belgium, the Netherlands, and Denmark seem to be similar at least in some respects. Somewhat surprisingly, Germany seems to be left out of these groups. However, it could be considered a group of its own from which other continental countries deviate, since the Netherlands and Belgium associate with different groups: the Netherlands associates with Finland, the UK and Portugal and Belgium aligns closer to Denmark because of the low household work supply. When analysing differences in time use one can define the following typology:

1) Central Europe, which has relatively fewer paid work hours (Germany and Belgium) and average domestic work hours (Germany);
2) small countries (Finland, the Netherlands and Portugal) and the UK, which have more paid work hours and more domestic work hours for men (except for Portugal) and more domestic work hours for women; and
3) exceptions, such as Denmark, which have relatively little domestic work, but with some similarity to the Nordic regime and Belgium, with little domestic work (for women as well, contrary to expectations about the continental regime).

It is evident that the small number of countries does not allow for a deeper analysis of the southern regime (Portugal, Spain and Greece) or to make any definite conclusions about the Nordic regime (Denmark, Finland, Sweden and Norway). What we can see is some similarity among continental countries and another group that includes the UK and the smaller countries, with the Nordic regime somewhat distinct from the others.

6.2 Time use by gender and employment status

We found clear differences in time use with respect to employment status, gender and country. The non-employed both spend more time at home and supply more household work than the employed. Women supply more household work than men do, regardless of employment status, but the allocation is more equal among the non-employed. Respectively, men supply more paid work than women do. Thus men and women contribute equally to total work in most countries. This shows the relevance of considering the allocation of the total work between paid work and domestic work. Leisure time is relatively less affected when domestic work substitutes paid work after retirement. This leads us to believe the specialisation of work to be an important issue, as Becker initially emphasised. The ‘continuity of lifetime patterns’ hypothesis does not hold for domestic work, since it is clearly an alternative for paid work after retirement. The dual burden of paid work and domestic work is, in any case, a less-compelling issue in making the retirement decision, while for young families with small children it can be more relevant.

It is true, however, that total work time (paid and domestic work) and thus the dual burden decreases after withdrawal from work, but by less than is often considered. In most of the countries changes in the amount of domestic work are even greater for men than for women when withdrawing from work. The time-use patterns of women and men become more similar after retirement. For men the increase in domestic work after withdrawal from the labour market is larger in relative terms (doubles on average) and

the effect of accounting for domestic work on the financial incentive to retire is greater for them. Men start from a position of spending 10 hours less in domestic work activities and hence the economic value of the change in domestic work is greater for men in the decision to retire. This can be explained by the gender specialisation of work and women's continuity of lifetime patterns: men supply more paid work before retirement while women specialise in domestic work. After retirement, women's time use changes by less than men's. In economic terms, the higher marginal value of non-work time follows from paid work and leisure work being more complementary and from the relatively high substitution elasticity between consumption and domestic work.

Earlier we discussed regional differences. In countries where the relative increase in the supply of household work after retirement is larger for men than for women, earlier retirement is more attractive to men. This is, in fact, evident in all countries except for the UK. Accounting for the value of household work yields on average 40% higher replacement rates, close to 100%, and respectively lower option values for retirement. A 30% decrease in the full replacement rate induces an increase in the employment rate of those aged 55-64 by 10%. Although the replacement rates with full incomes are rather similar for men and women, the option values for postponed retirement are for this reason lower for men than for women.

Household work therefore greatly encourages early retirement. The country differences in the incentives to retire are visible first in the varying values of household work, measured with the net hourly wage for this kind of work in each country. Second, the tax, social security and pension systems in each country produce different option-value paths for retirement. Their effect can further be reinforced by characteristics of time-use patterns. For example, in countries where the *relative* increase in the supply of household work after retirement is larger for men than for women, early retirement is relatively more attractive for men. This is, in fact, evident in all countries except for the UK.

6.3 Country regimes in retirement incentives

Differences among the countries in time use are still substantial. However, the time-use patterns follow the welfare-regime typology in a vague sense. Continental Europe (Germany) is distinct and the small continental countries – the Netherlands and Belgium also show some similarity to Germany. The Nordic regime also seems clearly apparent. Portugal is different from the other countries with little domestic work by men and an average amount for women, but time-use is still similar to that in the UK. Southern Europe does not, hence, show up here as a different regime in time use although other factors typical for southern Europe may explain later retirement.

In retirement schemes, continental Europe (Germany) exhibits a system of its own with high replacement rates and flat option-value curves after the pensionable age. Most of the other countries studied are small and differ in pension schemes. These are categorised as those with:

1) regimes with a high replacement rate and a flat option-value curve after the pensionable age – Central Europe (Germany), Finland and Portugal;

2) regimes with a high replacement rate and a downward sloping option-value curve after the pensionable age (Belgium and the Netherlands);

3) regimes with a low replacement rate and a rising option value after the pensionable age (Denmark and the UK).

6.4 Retirement incentives

Incentives to retire depend in general on two things. First, higher replacement rates and pension wealth enhance the incentive for early retirement. Second, retirement incentives depend on earned income prospects with the foregone domestic work. Since the expected lifetime at age 65 is limited, around 12 years for men and 17 years for women (when considered at age 55), pension accruals after pensionable age must be relatively high in order for the option value to be flat. This is especially true with high pension wealth (replacement rate), since additional income from work is of low importance. Pension wealth accrual has to be greatly enhanced in order for the postponement of retirement to become attractive. An example of this is the new pension scheme in Finland, where pension wealth stays the same irrespective of the decision to retire and pension wealth accrual at age 63-67 is high at 4.5% annually. Hence, the new system leads to indifference on the part of the individual with regard to when to retire.

With low replacement rates it is possible that the option value after pensionable age slopes upward. The reason is the high value of extra income earned as opposed to the accumulation of pension wealth. Such is the case in the UK and Denmark, where option-value curves are upward-sloping after retirement age.

It is evident that in the country typology, Central Europe remains a distinct regime. The pension scheme is relatively generous but it is partly outweighed by enhanced pension wealth accrual around age 65. Domestic work supply is relatively fixed over a lifetime, which explains why replacement rates do not exceed 100% before age 67.

Small countries and the UK also show distinct pension scheme systems that can be divided into three groups. In Finland and Portugal, domestic work increases a lot after withdrawal from work and replacement rates are high. Portugal differs still from other countries owing to a later retirement age. This can be explained by its time-use patterns, which are typical for the southern regime. The Netherlands and Belgium have no additional pension wealth accrual, after achieving the maximum replacement rate well before pensionable age. The domestic work also has a relatively significant increase after retirement. The value of foregone domestic work explains the low option-values for continuing to work and in the absence of pension accrual incentives the option-value curves slope downwards.

The countries with a low replacement rate such as Denmark and the UK or countries with low pension wealth such as Portugal can be most successful in achieving the objective of postponed retirement. On the other hand, in many countries, private pension schemes are important (as in the UK) or private pension savings are heavily tax-subsidised (as in Denmark), so inclusion of the financial incentives from private schemes may alter the results.

6.5 Health status

Whereas the time spent by healthy persons on domestic work is a more significant determinant of retirement for men, health status could be viewed as more important for women. If women value domestic work more highly than men do, they might be more prone to retire early for health reasons in order to be able to catch the benefit from domestic work while still able perform household chores. The effect of health on retirement incentives indeed differs between genders. For men, the replacement rates inclusive of the value of domestic work are lower for unhealthy men (84% on average) than for their healthy counterparts. Unhealthy women have instead on average higher replacement rates (95%) than healthy women (84%). One reason is that women adjust their work supply by less with respect to health status and in some cases, in fact, unhealthy women supply more domestic work than healthy women do – an average of 32 hours per week. Thus unhealthy women clearly have a relatively high total work burden.

It is generally argued that individuals with poor health may be forced to leave the labour force. It has been shown that women in poor health have clear incentives to leave the labour force, because of the high value of non-work time in household work and their high total work burden. More flexible working hours and part-time retirement are key to maintaining high employment rates for women with poor health. An important target group for men are also those with good health, since those with poor health already adjust their labour supply.

In the small country group (Netherlands but also including the UK), health has the largest influence on labour supply. Men reporting bad or bad health work 20 hours less per week in the Netherlands and UK. Women reporting bad health work 4 to 6 hours less per week. In other countries the effects are minor or even opposite (for Danish women). We can explain country differences or differences between genders by at least four alternative points of view. The first possible explanation is justification hypothesis (Bound, 1991). Those with poor health justify low labour force participation by bad health. The disability pension rules can vary across countries explaining also the need for justification. The justification hypothesis has been also used to explain why women report more bad health than men. We, however, use fairly objective measure of health so that this should not play a crucial role. Health status had to also be estimated in other countries except for Finland. Poor health thus captures the time use effects of poor labour market status or being single that correlate with it. The second related reason can be institutions and labour market characteristics. The Netherlands have high share of part-time workers. Those with poor health have a clear alternative to lower their work burden. It is also clear that household work can play a greater role in The Netherlands compared to Scandinavian countries. A third explanation can be explained by considering health as one consumption bundle following Grossman's model (1972). Health as a consumption bundle works as a clear substitute for paid work. Those with poor health need to consume health more and can do this only by reducing paid work hours. Moreover, health as a consumption bundle can be a clear complement for unpaid household work, especially for women. It appears that household work supply is strikingly high for women in poor health both in the Netherlands and in

United Kingdom. Finally, in Grossman's approach health is also considered as a lifetime investment. Health capital corresponds to human capital so that it decays over time and requires continuing investment. The final point of view is then the possible different needs to invest in health capital and in time horizons in health capital between the countries. The Netherlands and United Kingdom may appear to be countries with fairly good health services in the event of bad health. Thus there may appear less need for working longer in order to provide funds for covering the likely health expenses in the future when being already currently in bad health.

The common European concern over the challenges presented by the demographic ageing pattern and the falling labour force participation rates of the older age groups in European economies has prompted an effort towards a better understanding of the retirement decision process. The result obtained in this work – that accounting for the value of household work in financial incentive calculations makes early retirement more attractive – gives a partial explanation to the low average withdrawal ages from the labour force presented in Table 1. In fact, the exact optimal path for retirement, when planned at age 55, can be quite close to the actual average retirement in countries with low option-values such as Belgium and the Netherlands (men). In some countries with high option values for continuing to work (notably Germany and Finland), pension wealth can, however, be so high as to enable the individual to retire. The incentive may not be effective if pension wealth does not constrain the possibility of early retirement. The additional pension income must indeed be around 5% per year for it to be desirable to postpone retirement from a financial point of view. The reason is the relatively short span of life left at age 65.

It is also clear that people consider other incentives in addition to financial ones. Individual characteristics, such as the health status and own perception of life expectancy, arguably have a strong effect on the retirement behaviour of older persons. As a minimum, this study indicates that any incentive calculation may fail if the untaxed income from domestic work is not taken into account.

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Appendix A. Tax Wedges

We can write the observed gross wages in the market as

$$w = w_o(1+s) \tag{A.1}$$

w_o = wages with no employer's social security tax

s = employer's social security tax

w = observed gross wages

New wages of employees are

$$w_n = w(1-m) \tag{A.2}$$

m = average wage tax rate

Assuming that incomes are used for consumption

$$w_n = w_c(1+k) \tag{A.3}$$

k = average consumption tax rate based on pre-tax price of consumption

These give for the total average tax rate

$$M = \frac{w - w_c}{w} = \frac{w_o(1+s) - w_o\dfrac{1-m}{1+k}}{w(1+s)} \tag{A.4}$$

$$\Leftrightarrow \quad M = 1 - \frac{1-m}{(1+s)(1+k)} \tag{A.5}$$

This can be decomposed into three components

$$M = M_s + M_m + M_k \tag{A.6}$$

where

$M_s = \dfrac{ws}{w(1+s)} = \dfrac{s}{1+s}$ the effect of employer's social security lowering gross wages

$M_m = \dfrac{wm}{w(1+s)} = \dfrac{m}{1+s}$ the effect of wage tax rate

$M_k = \dfrac{w_c k}{w(1+s)} = \dfrac{w_o k/(1+k)}{w(1+s)} = \dfrac{(1-m)k/(1+k)}{1+s}$ the effect of consumption tax rate.

Appendix B. Logistic Models for Health

Table B1. Logistic model for poor health status for those aged 45–64 in Denmark

	Men employed	**Men Non-employed**	**Women employed**	**Women Non-employed**
Age	0.80	0.95	-0.45	-0.86
	(1.16)	(0.97)	(-0.69)	(-1.03)
Age2	-0.0074	-0.0093	0.0042	0.0071
	(-1.16)	(-1.06)	(0.68)	(0.96)
Highly educated	1.55		0.34	-1.66
	(1.34)		(0.78)	(-0.82)
Income percentile 25-75	-0.38	-0.36	-0.75	-0.89
	(-1.07)	(-0.52)	(-1.04)	(2.32)*
Income percentile 75-90	-1.99	-1.93	-0.42	1.37
	(-2.49)*	(-2.13)*	(-1.04)	(1.41)
Income percentile 90-100	-0.22	-2.03	-1.00	1.06
	(-0.26)	(-1.83)	(-1.73)	(1.63)
Child < 18 years	0.07	0.87	-0.25	1.27
	(0.14)	(-0.82)	(-0.44)	(0.85)
40+hrs a week	0.07		0.14	
	(0.18)		(0.3)	
Married	0.03	0.65	0.16	0.59
	(-0.06)	(-0.91)	(0.35)	(-2.71)
Observations	480	127	449	203
Pseudo R2	0.04	0.16	0.02	0.07

Robust z statistics in parentheses. * significant at 5%; ** significant at 1%.

Table B2. Logistic model for poor health status for those aged 45–64 in Germany

	Men employed	**Men Non-employed**	**Women employed**	**Women Non-employed**
Age	-0.04	0.65	-0.21	0.96
	(-0.1)	(1.23)	(-0.44)	(2.56)*
Age2	0.0011	-0.0058	0.0020	-0.0082
	(0.3)	(-1.23)	(0.44)	(-2.39)*
Highly educated				
Income percentile 25-75	-0.11	-0.27	-0.27	-0.17
	(-0.51)	(-0.82)	(-0.92)	(-0.63)
Income percentile 75-90	-0.49	-0.43	-0.08	0.04
	(-1.71)	(-1.06)	(-0.21)	(0.13)
Income percentile 90-100	-0.85	-0.71	-0.98	0.04
	(-2.48)*	(-1.18)	(-2.14)*	(0.1)
Child < 18 years	-0.12	0.57	-0.02	0.11
	(-0.4)	(0.83)	(-0.03)	(0.3)
40+hrs a week	-0.22		0.27	
	(-1.21)		(1.17)	
Married	0.23	-0.45	0.11	0.14
	(0.72)	(-1.14)	(0.35)	(0.47)
Observations	1133	583	826	939
Pseudo R2	0.04	0.03	0.02	0.03

Robust z statistics in parentheses. * significant at 5%; ** significant at 1%.

Table B3. Logistic model for poor health status for those aged 45–64 in the Netherlands

	Men employed	**Men Non-employed**	**Women employed**	**Women Non-employed**
Age	-0.02	-0.62	-0.81	0.22
	(-0.05)	(-0.85)	(-1.3)	(0.7)
Age2	0.0002	0.0041	0.0078	-0.0017
	(0.05)	(0.63)	(1.3)	(-0.61)
Highly educated	-1.50	-1.27	0.61	
	(-1.43)	(-0.83)	(0.75)	
Income percentile 25-75	-0.15	-0.57	-0.06	-0.07
	(-0.63)	(-1.68)	(-0.2)	(-0.34)
Income percentile 75-90	-0.47	-0.76	-0.74	0.13
	(-1.43)	(-1.71)	(-1.6)	(0.5)
Income percentile 90-100	0.14	0.00	0.11	-0.18
	(0.39)	(0)	(0.25)	(-0.58)
Child < 18 years	-0.13	0.48	-0.18	-0.57
	(-0.5)	(1.11)	(-0.53)	(-2.44)*
40+hrs a week	-0.60		-0.46	
	(-2.52)*		(-0.77)	
Married	-0.25	0.72	-0.33	-0.32
	(-0.81)	(2.09)*	(-1.01)	(-1.4)
Observations	1037	350	562	878
Pseudo R2	0.02	0.12	0.02	0.02

Robust z statistics in parentheses. * significant at 5%; ** significant at 1%.

Table B4. Logistic model for poor health status for those aged 45–64 in the UK

	Men employed	**Men Non-employed**	**Women employed**	**Women Non-employed**
Age	1.27	0.07	0.69	1.15
	(2.01)*	(0.14)	(1.3)	(2.92)**
Age2	-0.0113	-0.0004	-0.0063	-0.0104
	(-1.93)	(-0.09)	(-1.29)	(-2.93)**
Highly educated		-1.54	0.80	
		(-1.23)	(0.57)	
Income percentile 25-75	-0.87	-0.26	-0.23	-0.06
	(-2.19)*	(-0.84)	(-0.84)	(-0.25)
Income percentile 75-90	-0.58	-0.88	-1.07	-0.35
	(-1.09)	(-1.97)*	(-2.19)*	(-1.03)
Income percentile 90-100	-1.76	-2.11	0.03	-0.52
	(-2.11)	(-3.46)**	(0.07)	(-1.2)
Child < 18 years	0.64	0.30	0.60	-0.38
	(1.12)	(0.61)	(0.99)	(-0.85)
40+hrs a week	-0.73		-0.08	
	(-2.06)*		(-0.27)	
Married	-0.57	0.30	0.19	-0.40
	(-1.26)	(0.88)	(0.66)	(-1.53)
Observations	814	331	715	619
Pseudo R2	0.07	0.05	0.02	0.03

Robust z statistics in parentheses. * significant at 5%; ** significant at 1%.

Appendix C. OECD Country Tables for All (2002)

Table C1. Incentive calculations, Belgium average earnings men, all

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	Partial	Total	Partial	Total	Partial	Total	Partial	Total	Partial
55	1.04	0.75	292.93	216.66	…	…	…	…	5.81	8.24
56	1.04	0.75	292.93	216.66	…	…	…	…	11.63	16.49
57	1.04	0.75	292.93	216.66	…	…	…	…	17.44	24.73
58	1.04	0.75	292.93	216.66	…	…	…	…	23.25	32.97
59	1.04	0.75	292.93	216.66	…	…	…	…	29.06	41.22
60	1.04	0.75	292.93	216.66	…	…	…	…	13.27	33.48
61	1.04	0.75	271.33	200.68	-21.60	-15.98	-254.75	-187.26	-1.88	26.22
62	1.04	0.75	250.36	185.17	-20.97	-15.51	-247.33	-181.81	-16.43	19.40
63	1.04	0.75	229.99	170.11	-20.36	-15.06	-240.13	-176.51	-30.39	13.02
64	1.04	0.75	210.23	155.49	-19.77	-14.62	-233.13	-171.37	-43.77	7.07
65	1.04	0.75	191.04	141.30	-19.19	-14.19	-226.34	-166.38	-56.59	1.53
66	1.04	0.75	172.40	127.52	-18.63	-13.78	-219.75	-161.53	-68.86	-3.60
67	1.04	0.75	154.31	114.14	-18.09	-13.38	-213.35	-156.83	-80.62	-8.35
68	1.04	0.75	146.20	108.62	-18.09	-13.38	-213.35	-156.83	-91.85	-12.72
69	1.04	0.75	128.87	95.79	-17.56	-12.99	-207.13	-152.26	-102.60	-16.72
70	1.04	0.75	112.05	83.33	-17.05	-12.61	-201.10	-26.93	-112.86	-20.37

	Earnings	Domestic
Employed	8.24	1.16
Retired	3.59	6.23

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C2. Incentive calculations, Belgium average earnings women, all

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	1.37	0.86	415.27	273.69	…	…	…	…	2.57	6.63
56	1.37	0.86	415.27	273.69	…	…	…	…	5.14	13.26
57	1.37	0.86	415.27	273.69	…	…	…	…	7.71	19.90
58	1.37	0.86	415.27	273.69	…	…	…	…	10.27	26.53
59	1.37	0.86	415.27	273.69	…	…	…	…	12.84	33.16
60	1.37	0.86	415.27	273.69	…	…	…	…	-9.89	23.12
61	1.37	0.86	389.97	260.49	-25.30	-16.67	-414.38	-277.57	-31.88	13.56
62	1.37	0.86	365.41	244.21	-24.56	-16.19	-402.31	-269.49	-53.16	4.48
63	1.37	0.86	341.57	228.39	-23.85	-15.72	-390.60	-261.64	-73.74	-4.15
64	1.37	0.86	318.41	213.04	-23.15	-15.26	-379.22	-254.02	-93.65	-12.33
65	1.37	0.86	295.94	198.13	-22.48	-14.81	-368.17	-246.62	-112.90	-20.08
66	1.37	0.86	274.12	183.66	-21.82	-14.38	-357.45	-239.44	-131.52	-27.41
67	1.37	0.86	252.93	169.61	-21.19	-13.96	-347.04	-232.46	-149.52	-34.34
68	1.37	0.86	232.36	155.97	-20.57	-13.56	-336.93	-225.69	-166.93	-40.87
69	1.37	0.86	212.39	142.72	-19.97	-13.16	-327.12	-219.12	-183.75	-47.02
70	1.37	0.86	193.00	129.86	-19.39	-12.78	-317.59	-25.46	-200.00	-52.79
	Earnings	**Domestic**								
Employed	6.63	1.75								
Retired	5.47	5.81								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C3. Incentive calculations, Denmark average earnings men, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.78	0.48	142.77	80.23	…	…	…	…	10.95	11.81
56	0.82	0.48	142.77	80.23	…	…	…	…	21.90	30.44
57	0.82	0.48	142.77	80.23	…	…	…	…	32.85	45.67
58	0.82	0.48	142.77	80.23	…	…	…	…	43.80	60.89
59	0.82	0.48	142.77	80.23	…	…	…	…	54.75	76.11
60	0.82	0.48	142.77	80.23	…	…	…	…	65.70	91.33
61	0.82	0.48	142.77	80.23	…	…	…	…	65.61	100.35
62	0.82	0.48	131.73	74.03	-11.03	-6.20	-75.25	-43.32	65.85	109.56
63	0.82	0.48	121.02	68.01	-10.71	-6.02	-73.06	-42.06	66.39	118.93
64	0.82	0.48	110.62	62.17	-10.40	-5.85	-70.93	-40.83	77.04	141.29
65	0.90	0.58	110.31	69.30	-0.31	7.13	-4.24	46.62	77.23	149.75
66	0.90	0.58	99.55	62.54	-10.76	-6.76	-73.16	-46.90	77.73	158.41
67	0.90	0.58	89.11	55.98	-10.45	-6.56	-71.03	-45.54	78.54	167.26
68	0.90	0.58	78.96	49.61	-10.14	-6.37	-68.96	-44.21	79.64	176.30
69	0.90	0.58	69.12	43.42	-9.85	-6.19	-66.95	-42.92	81.63	186.31
70	0.91	0.59	60.16	38.21	-8.96	-5.21	-60.91	-15.76	83.21	195.58

	Earnings	**Domestic**
Employed	15.22	4.67
Retired	6.66	8.94

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C4. Incentive calculations, Denmark average earnings men, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.65	0.48	112.18	80.23	…	…	…	…	14.03	11.81
56	0.65	0.48	112.18	80.23	…	…	…	…	28.05	30.44
57	0.65	0.48	112.18	80.23	…	…	…	…	42.08	45.67
58	0.65	0.48	112.18	80.23	…	…	…	…	56.11	60.89
59	0.65	0.48	112.18	80.23	…	…	…	…	70.13	76.11
60	0.65	0.48	112.18	80.23	…	…	…	…	84.16	91.33
61	0.65	0.48	112.18	80.23	…	…	…	…	89.52	100.35
62	0.65	0.48	103.51	74.03	-8.67	-6.20	-59.32	-43.32	95.13	109.56
63	0.65	0.48	95.10	68.01	-8.42	-6.02	-57.59	-42.06	100.98	118.93
64	0.65	0.48	86.92	62.17	-8.17	-5.85	-55.91	-40.83	117.21	141.29
65	0.73	0.58	89.13	69.30	2.20	7.13	12.80	46.62	122.54	149.75
66	0.73	0.58	80.43	62.54	-8.69	-6.76	-59.25	-46.90	128.13	158.41
67	0.73	0.58	71.99	55.98	-8.44	-6.56	-57.52	-45.54	133.96	167.26
68	0.73	0.58	63.80	49.61	-8.19	-6.37	-55.85	-44.21	140.04	176.30
69	0.73	0.58	55.84	43.42	-7.96	-6.19	-54.22	-42.92	146.96	186.31
70	0.74	0.59	48.75	38.21	-7.10	-5.21	-48.38	-15.76	153.39	195.58
	Earnings	**Domestic**								
Employed	15.22	3.98								
Retired	6.66	5.17								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C5. Incentive calculations, Denmark average earnings women, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.78	0.56	93.38	82.68	…	…	…	…	11.56	13.05
56	0.78	0.56	93.38	82.68	…	…	…	…	23.12	26.11
57	0.78	0.56	93.38	82.68	…	…	…	…	34.68	39.16
58	0.78	0.56	93.38	82.68	…	…	…	…	46.24	52.22
59	0.78	0.56	93.38	82.68	…	…	…	…	57.80	65.27
60	0.78	0.56	93.38	82.68	…	…	…	…	69.36	78.33
61	0.78	0.56	93.38	82.68	…	…	…	…	74.82	85.99
62	0.78	0.56	87.28	77.28	-6.09	-5.40	-46.14	-44.58	80.46	93.81
63	0.78	0.56	81.37	72.04	-5.92	-5.24	-44.80	-43.28	86.28	101.78
64	0.78	0.56	75.62	66.96	-5.74	-5.09	-43.49	-42.02	103.18	123.51
65	0.86	0.68	80.96	75.64	5.34	8.68	46.46	68.19	108.48	130.72
66	0.86	0.68	74.70	69.79	-6.26	-5.85	-47.85	-48.03	114.10	138.61
67	0.86	0.69	68.77	64.63	-5.94	-5.16	-45.67	-42.42	119.75	146.11
68	0.86	0.69	62.86	59.08	-5.91	-5.55	-45.17	-45.64	125.57	153.77
69	0.86	0.69	57.12	53.68	-5.74	-5.39	-43.85	-44.31	132.18	161.89
70	0.64	0.54	52.17	48.74	-4.95	-4.94	-36.88	-30.37	138.26	169.83
	Earnings	**Domestic**								
Employed	13.05	6.55								
Retired	6.70	8.04								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C6. Incentive calculations, Denmark average earnings women, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.97	0.50	166.18	114.74	…	…	…	…	7.99	14.56
56	0.97	0.50	166.18	114.74	…	…	…	…	15.98	29.11
57	0.97	0.50	166.18	114.74	…	…	…	…	23.96	43.67
58	0.97	0.50	166.18	114.74	…	…	…	…	31.95	58.22
59	0.97	0.50	166.18	114.74	…	…	…	…	39.94	72.78
60	0.97	0.50	166.18	114.74	…	…	…	…	47.93	87.33
61	0.97	0.50	166.18	114.74	…	…	…	…	45.07	94.40
62	0.97	0.50	155.34	107.26	-10.84	-7.49	-71.21	-54.91	42.53	101.69
63	0.97	0.50	144.81	99.99	-10.53	-7.27	-69.13	-53.31	40.30	109.18
64	0.97	0.50	134.59	92.93	-10.22	-7.06	-67.12	-51.76	55.08	136.69
65	1.04	0.61	141.38	105.88	6.79	12.95	56.51	90.08	52.14	143.06
66	1.04	0.61	130.46	97.70	-10.93	-8.18	-72.67	-59.63	49.72	150.39
67	1.05	0.62	120.04	90.47	-10.41	-7.23	-69.54	-52.65	47.39	157.17
68	1.05	0.62	109.73	82.69	-10.32	-7.78	-68.59	-56.66	45.36	164.18
69	1.05	0.62	99.71	75.15	-10.02	-7.55	-66.59	-55.01	44.58	171.82
70	0.78	0.48	90.94	68.23	-8.77	-6.92	-56.85	-37.10	43.02	179.21
	Earnings	**Domestic**								
Employed	14.56	7.36								
Retired	6.67	13.93								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C7. Incentive calculations, Finland average earnings men, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.90	0.40	215.40	101.99 …	…		…	…	12.62	19.90
56	0.92	0.44	220.67	110.97	5.27	8.98	56.81	97.80	25.23	39.80
57	0.94	0.47	225.94	119.96	5.27	8.98	56.81	97.80	37.85	59.70
58	0.96	0.51	231.21	128.94	5.27	8.98	56.81	97.80	50.46	79.60
59	0.98	0.54	236.49	137.92	5.27	8.98	56.81	97.80	63.08	99.50
60	1.00	0.58	241.76	146.91	5.27	8.98	56.81	97.80	75.69	119.40
61	1.02	0.61	247.03	155.89	5.27	8.98	56.81	97.80	88.31	139.30
62	1.04	0.65	252.30	164.88	5.27	8.98	56.81	97.80	96.01	170.36
63	1.12	0.78	252.65	185.02	0.35	20.15	-2.68	219.34	91.77	180.52
64	1.16	0.85	241.08	184.27	-11.58	-0.75	-131.05	-8.18	86.82	188.90
65	1.19	0.91	228.78	181.73	-12.30	-2.54	-138.68	-27.64	81.18	195.57
66	1.23	0.97	215.79	177.49	-12.99	-4.24	-145.88	-46.18	74.89	200.62
67	1.26	1.03	202.16	171.63	-13.63	-5.86	-152.67	-63.84	67.99	204.13
68	1.30	1.09	187.92	164.22	-14.24	-7.41	-159.07	-80.66	60.52	206.17
69	1.33	1.16	173.10	155.34	-14.82	-8.88	-165.10	-96.67	49.24	201.25
70	1.34	1.17	154.48	139.51	-18.62	-15.83	-205.88	-172.33	78.66	227.84
	Earnings	**Domestic**								
Employed	8.65	6.53								
Retired	3.56	10.11								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C8. Incentive calculations, Finland average earnings men, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.89	0.40	213.10	101.99	…	…	…	…	12.61	19.90
56	0.91	0.44	218.13	110.97	5.03	8.98	54.19	97.80	25.22	39.80
57	0.93	0.47	223.16	119.96	5.03	8.98	54.19	97.80	37.83	59.70
58	0.95	0.51	228.20	128.94	5.03	8.98	54.19	97.80	50.44	79.60
59	0.97	0.54	233.23	137.92	5.03	8.98	54.19	97.80	63.05	99.50
60	0.99	0.58	238.26	146.91	5.03	8.98	54.19	97.80	75.65	119.40
61	1.01	0.61	243.29	155.89	5.03	8.98	54.19	97.80	88.26	139.30
62	1.03	0.65	248.32	164.88	5.03	8.98	54.19	97.80	95.62	170.36
63	1.10	0.78	248.10	185.02	-0.22	20.15	-8.83	219.34	91.61	180.52
64	1.13	0.85	236.51	184.27	-11.59	-0.75	-131.09	-8.18	86.93	188.90
65	1.17	0.91	224.25	181.73	-12.26	-2.54	-138.19	-27.64	81.60	195.57
66	1.20	0.97	211.35	177.49	-12.90	-4.24	-144.88	-46.18	75.68	200.62
67	1.24	1.03	197.85	171.63	-13.50	-5.86	-151.19	-63.84	69.18	204.13
68	1.27	1.09	183.77	164.22	-14.07	-7.41	-157.14	-80.66	62.15	206.17
69	1.30	1.16	169.17	155.34	-14.61	-8.88	-162.73	-96.67	51.51	201.25
70	1.31	1.17	150.95	139.51	-18.22	-15.83	-201.47	-172.33	41.18	196.39
	Earnings	**Domestic**								
Employed	8.65	7.29								
Retired	3.56	10.63								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C9. Incentive calculations, Finland average earnings women, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	1.00	0.36	91.10	80.43	…	…	…	…	12.21	15.82
56	1.02	0.39	99.13	87.51	8.02	7.08	104.55	93.84	24.41	31.64
57	1.03	0.42	107.15	94.60	8.02	7.08	83.67	74.92	36.62	47.46
58	1.04	0.46	115.18	101.68	8.02	7.08	104.55	93.84	48.82	63.28
59	1.05	0.49	123.20	108.77	8.02	7.08	104.55	93.84	61.03	79.10
60	1.07	0.52	131.23	115.85	8.02	7.08	104.55	93.84	73.23	94.92
61	1.08	0.55	139.25	122.93	8.02	7.08	104.55	93.84	85.44	110.74
62	1.09	0.58	147.27	130.02	8.02	7.08	104.55	93.84	109.91	137.39
63	1.14	0.71	167.56	147.93	20.28	17.91	264.29	237.21	115.99	147.81
64	1.16	0.76	169.47	149.61	1.91	1.68	24.85	22.31	120.76	157.06
65	1.18	0.82	170.06	150.13	0.59	0.52	7.67	6.88	124.28	165.21
66	1.21	0.87	169.39	149.54	-0.67	-0.59	-8.71	-7.81	126.59	172.30
67	1.23	0.93	167.52	147.89	-1.87	-1.65	-24.31	-21.82	127.77	178.38
68	1.25	0.99	164.52	145.24	-3.01	-2.65	-39.16	-35.15	127.86	183.51
69	1.27	1.04	160.43	141.63	-4.09	-3.61	-53.30	-47.84	120.97	182.47
70	1.28	1.06	149.36	131.86	-11.07	-9.77	-144.18	-129.40	157.53	220.80
	Earnings	**Domestic**								
Employed	7.21	11.06								
Retired	3.56	10.11								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C10. Incentive calculations, Finland average earnings women, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	1.01	0.42	142.08	150.14	…	…	…	…	19.02	25.38
56	1.03	0.46	154.59	163.37	12.51	13.22	125.09	131.87	38.05	50.75
57	1.05	0.49	167.11	176.59	12.51	13.22	125.09	131.87	57.07	76.13
58	1.07	0.53	179.62	189.82	12.51	13.22	125.09	131.87	76.10	101.51
59	1.09	0.57	192.14	203.04	12.51	13.22	125.09	131.87	95.12	126.88
60	1.11	0.60	204.65	216.26	12.51	13.22	125.09	131.87	114.15	152.26
61	1.13	0.64	217.17	229.49	12.51	13.22	125.09	131.87	133.17	177.64
62	1.15	0.68	229.68	242.71	12.51	13.22	125.09	131.87	171.32	223.22
63	1.22	0.82	261.31	276.14	31.63	33.43	316.20	333.35	180.80	238.51
64	1.25	0.89	264.29	279.29	2.97	3.14	29.74	31.35	188.23	251.63
65	1.28	0.95	265.21	280.26	0.92	0.97	9.17	9.67	193.70	262.68
66	1.32	1.02	264.17	279.16	-1.04	-1.10	-10.42	-10.98	197.30	271.76
67	1.35	1.08	261.26	276.08	-2.91	-3.07	-29.08	-30.66	199.12	278.96
68	1.38	1.15	256.57	271.13	-4.69	-4.95	-46.85	-49.39	199.25	284.37
69	1.42	1.21	250.19	264.39	-6.38	-6.74	-63.77	-67.23	188.51	278.28
70	1.43	1.23	232.93	246.15	-17.26	-18.24	-172.50	-181.86	177.82	272.26
	Earnings	**Domestic**								
Employed	9.47	9.28								
Retired	3.56	10.63								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C11. Incentive calculations, Finland (old system) average earnings men, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.85	0.41	230.69	117.67	…	…	…	…	9.87	14.84
56	0.86	0.42	233.22	121.59	2.53	3.92	45.00	78.05	19.74	29.68
57	0.87	0.44	235.74	125.51	2.53	3.92	45.00	78.05	29.61	44.51
58	0.88	0.45	238.27	129.44	2.53	3.92	45.00	78.05	39.48	59.35
59	0.88	0.46	240.80	133.36	2.53	3.92	45.00	78.05	49.35	74.19
60	0.89	0.48	243.32	137.28	2.53	3.92	45.00	78.05	44.13	81.89
61	0.91	0.50	230.76	134.07	-12.57	-3.21	-310.53	-63.89	38.83	89.01
62	0.92	0.52	218.11	130.27	-12.64	-3.80	-309.32	-75.62	33.47	95.57
63	0.94	0.55	205.41	125.91	-12.70	-4.36	-308.00	-86.76	24.94	96.75
64	0.94	0.55	189.53	116.18	-15.88	-9.73	-362.12	-193.65	16.87	98.22
65	0.94	0.55	174.12	106.73	-15.41	-9.45	-351.57	-188.01	9.25	99.96
66	0.94	0.55	159.15	97.56	-14.97	-9.17	-341.33	-182.53	2.06	101.97
67	0.94	0.55	144.62	88.65	-14.53	-8.91	-331.39	-177.22	-4.70	104.24
68	0.94	0.55	130.52	80.00	-14.11	-8.65	-321.74	-172.06	-11.05	106.76
69	0.94	0.55	116.82	71.61	-13.70	-8.39	-312.37	-167.04	-17.01	109.52
70	0.94	0.55	103.53	63.46	-13.30	-8.15	-303.27	-162.18	-22.57	112.53
	Earnings	**Domestic**								
Employed	8.81	6.53								
Retired	3.83	10.11								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C12. Incentive calculations, Finland (old system) average earnings men, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.84	0.41	229.04	117.67	…	…	…	…	10.01	14.84
56	0.85	0.42	231.46	121.59	2.43	3.92	42.92	78.05	20.01	29.68
57	0.86	0.44	233.89	125.51	2.43	3.92	42.92	78.05	30.02	44.51
58	0.87	0.45	236.32	129.44	2.43	3.92	42.92	78.05	40.02	59.35
59	0.88	0.46	238.75	133.36	2.43	3.92	42.92	78.05	50.03	74.19
60	0.88	0.48	241.17	137.28	2.43	3.92	42.92	78.05	45.03	81.89
61	0.90	0.50	228.60	134.07	-12.58	-3.21	-309.18	-63.89	39.97	89.01
62	0.91	0.52	215.97	130.27	-12.63	-3.80	-307.64	-75.62	34.87	95.57
63	0.93	0.55	203.29	125.91	-12.68	-4.36	-306.02	-86.76	26.74	96.75
64	0.93	0.55	187.58	116.18	-15.71	-9.73	-357.27	-193.65	19.06	98.22
65	0.93	0.55	172.32	106.73	-15.25	-9.45	-346.87	-188.01	11.83	99.96
66	0.93	0.55	157.51	97.56	-14.81	-9.17	-336.77	-182.53	5.03	101.97
67	0.93	0.55	143.13	88.65	-14.38	-8.91	-326.96	-177.22	-1.36	104.24
68	0.93	0.55	129.17	80.00	-13.96	-8.65	-317.43	-172.06	-7.33	106.76
69	0.93	0.55	115.62	71.61	-13.55	-8.39	-308.19	-167.04	-12.91	109.52
70	0.93	0.55	102.46	63.46	-13.16	-8.15	-299.21	-162.18	-18.11	112.53
	Earnings	**Domestic**								
Employed	8.81	7.29								
Retired	3.83	10.63								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C13. Incentive calculations, Finland (old system) average earnings women, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.97	0.39	102.67	107.32	…	…	…	…	7.60	11.89
56	0.97	0.40	106.09	110.89	3.42	3.15	37.17	34.29	15.21	23.78
57	0.98	0.42	109.51	114.47	3.42	3.15	27.41	25.22	22.81	35.67
58	0.98	0.43	112.93	118.05	3.42	3.15	37.17	34.29	30.41	47.56
59	0.99	0.44	116.36	121.62	3.42	3.15	37.17	34.29	38.02	59.45
60	0.99	0.46	119.78	125.20	3.42	3.15	37.17	34.29	40.71	66.81
61	1.00	0.48	118.29	122.83	-1.49	-1.37	-18.15	-16.73	42.96	73.77
62	1.01	0.50	116.36	119.95	-1.92	-1.77	-20.90	-19.28	44.81	80.35
63	1.02	0.52	114.03	116.59	-2.34	-2.15	-25.39	-23.42	41.81	82.47
64	1.02	0.52	106.84	108.27	-7.18	-6.62	-78.00	-71.95	39.02	84.79
65	1.02	0.52	99.87	100.19	-6.97	-6.42	-75.73	-69.85	36.43	87.29
66	1.02	0.52	93.10	92.34	-6.77	-6.24	-73.52	-67.82	34.04	89.97
67	1.02	0.52	86.53	84.73	-6.57	-6.05	-71.38	-65.84	31.84	92.83
68	1.02	0.52	80.15	77.33	-6.38	-5.88	-69.30	-63.93	29.82	95.85
69	1.02	0.52	73.95	70.16	-6.19	-5.71	-67.28	-62.06	27.99	99.05
70	1.02	0.52	67.94	63.19	-6.01	-5.54	-65.32	-60.26	26.33	102.41
	Earnings	**Domestic**								
Employed	**Domestic**	11.06								
Retired	**Domestic**	15.62								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C14. Incentive calculations, Finland (old system) average earnings women, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.95	0.42	160.11	139.51	…	…	…	…	11.85	17.67
56	0.96	0.43	165.45	144.16	5.34	5.52	41.65	43.06	23.69	35.34
57	0.97	0.45	170.79	148.81	5.34	5.52	41.65	43.06	35.54	53.01
58	0.98	0.46	176.12	153.46	5.34	5.52	41.65	43.06	47.39	70.68
59	0.98	0.47	181.46	158.11	5.34	5.52	41.65	43.06	59.24	88.35
60	0.99	0.49	186.80	162.76	5.34	5.52	41.65	43.06	63.42	98.10
61	1.00	0.51	184.48	159.92	-2.32	-2.40	-18.13	-18.75	66.93	107.15
62	1.02	0.53	181.47	156.43	-3.00	-3.10	-23.43	-24.22	69.80	115.53
63	1.03	0.56	177.83	152.34	-3.65	-3.77	-28.45	-29.42	65.11	116.10
64	1.03	0.56	166.63	141.77	-11.20	-11.58	-87.41	-90.36	60.74	117.01
65	1.03	0.56	155.75	131.50	-10.87	-11.24	-84.87	-87.73	56.70	118.25
66	1.03	0.56	145.20	121.54	-10.56	-10.91	-82.39	-85.18	52.96	119.80
67	1.03	0.56	134.95	111.86	-10.25	-10.60	-79.99	-82.69	49.52	121.66
68	1.03	0.56	125.00	102.46	-9.95	-10.29	-77.66	-80.29	46.37	123.83
69	1.03	0.56	115.34	93.34	-9.66	-9.99	-75.40	-77.95	43.50	126.28
70	1.03	0.56	105.96	84.49	-9.38	-9.70	-73.21	-75.68	40.90	129.02
	Earnings	**Domestic**								
Employed	12.15	9.28								
Retired	5.29	14.92								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C15. Incentive calculations, Germany average earnings men, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.70	0.52	184.73	140.17	…	…	…	…	24.72	31.97
56	0.76	0.62	196.21	158.29	11.48	18.13	117.56	191.85	42.17	51.72
57	0.77	0.64	200.43	164.20	4.22	5.91	26.77	39.44	59.79	71.69
58	0.79	0.66	204.81	170.34	4.38	6.13	27.77	40.91	77.57	91.90
59	0.81	0.69	209.35	176.70	4.54	6.36	28.81	42.44	95.51	112.34
60	0.82	0.71	214.06	183.29	4.71	6.60	29.88	44.03	113.64	133.02
61	0.84	0.74	218.95	190.14	4.89	6.85	31.00	45.67	131.94	153.96
62	0.86	0.77	224.02	197.24	5.07	7.10	32.16	47.38	150.44	175.17
63	0.88	0.80	229.28	204.61	5.26	7.37	33.36	49.15	148.95	178.41
64	0.90	0.82	214.56	194.00	-14.72	-10.60	-96.49	-70.73	147.30	181.13
65	0.92	0.86	199.67	182.88	-14.89	-11.13	-97.46	-74.24	148.13	187.03
66	0.96	0.91	187.27	174.94	-12.41	-7.93	-81.63	-52.94	148.43	191.91
67	0.99	0.96	174.32	165.98	-12.94	-8.96	-84.95	-59.79	148.12	195.69
68	1.03	1.02	160.78	155.92	-13.54	-10.07	-88.66	-67.16	147.16	198.28
69	1.07	1.08	146.58	144.66	-14.20	-11.25	-92.78	-75.08	145.46	199.59
70	1.12	1.15	131.65	132.13	-14.93	-12.53	-97.34	-83.59	142.96	199.53
	Earnings	**Domestic**								
Employed	18.07	4.58								
Retired	9.25	5.08								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C16. Incentive calculations, Germany average earnings men, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.78	0.52	205.45	140.17	…	…	…	…	23.71	31.97
56	0.85	0.62	217.64	158.29	12.18	18.13	125.25	191.85	39.65	51.72
57	0.86	0.64	222.05	164.20	4.42	5.91	28.18	39.44	55.75	71.69
58	0.88	0.66	226.63	170.34	4.58	6.13	29.23	40.91	72.03	91.90
59	0.90	0.69	231.39	176.70	4.75	6.36	30.32	42.44	88.49	112.34
60	0.92	0.71	236.32	183.29	4.93	6.60	31.45	44.03	105.13	133.02
61	0.93	0.74	241.43	190.14	5.11	6.85	32.63	45.67	121.96	153.96
62	0.95	0.77	246.74	197.24	5.31	7.10	33.84	47.38	138.98	175.17
63	0.97	0.80	252.24	204.61	5.50	7.37	35.11	49.15	134.05	178.41
64	1.00	0.82	235.78	194.00	-16.46	-10.60	-108.76	-70.73	128.97	181.13
65	1.02	0.86	219.18	182.88	-16.61	-11.13	-109.58	-74.24	126.51	187.03
66	1.06	0.91	205.20	174.94	-13.98	-7.93	-92.71	-52.94	123.53	191.91
67	1.09	0.96	190.69	165.98	-14.51	-8.96	-96.01	-59.79	119.94	195.69
68	1.14	1.02	175.58	155.92	-15.11	-10.07	-99.72	-67.16	115.69	198.28
69	1.18	1.08	159.81	144.66	-15.77	-11.25	-103.87	-75.08	110.70	199.59
70	1.23	1.15	143.29	132.13	-16.51	-12.53	-108.49	-83.59	104.90	199.53
	Earnings	**Domestic**								
Employed	18.07	3.84								
Retired	9.25	5.78								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C17. Incentive calculations, Germany average earnings women, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.95	0.56	100.68	111.18	…	…	…	…	22.60	26.84
56	1.02	0.66	116.09	126.98	15.41	15.81	186.32	190.15	34.12	42.61
57	1.03	0.69	120.43	131.72	4.34	4.74	42.41	46.39	45.80	58.56
58	1.05	0.72	124.92	136.64	4.50	4.92	44.00	48.13	57.64	74.70
59	1.07	0.74	129.59	141.75	4.67	5.10	45.64	49.92	69.67	91.02
60	1.09	0.77	134.43	147.04	4.84	5.29	47.34	51.79	81.87	107.55
61	1.11	0.80	139.45	152.53	5.02	5.49	49.11	53.72	94.26	124.27
62	1.13	0.83	144.66	158.23	5.21	5.70	50.95	55.73	106.84	141.22
63	1.15	0.86	150.06	164.14	5.40	5.91	52.85	57.81	109.08	146.84
64	1.17	0.89	145.11	158.72	-4.95	-5.41	-48.40	-52.94	111.06	152.17
65	1.20	0.92	139.91	153.03	-5.21	-5.70	-50.94	-55.72	115.70	160.42
66	1.23	0.98	137.36	150.25	-2.54	-2.78	-24.86	-27.20	119.87	168.16
67	1.28	1.04	134.35	146.95	-3.01	-3.29	-29.47	-32.24	123.53	175.34
68	1.32	1.10	130.83	143.10	-3.52	-3.85	-34.44	-37.68	126.64	181.92
69	1.36	1.17	126.76	138.65	-4.07	-4.45	-39.81	-43.55	129.17	187.86
70	1.41	1.24	122.10	133.55	-4.66	-5.10	-45.60	-49.88	131.05	193.09
	Earnings	**Domestic**								
Employed	11.03	4.47								
Retired	6.16	8.32								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C18. Incentive calculations, the Netherlands average earnings men, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.89	0.44	266.97	151.57	…	…	…	…	10.92	16.04
56	0.90	0.44	269.92	155.02	…	…	…	…	19.87	29.76
57	0.90	0.45	270.87	156.14	…	…	…	…	29.25	43.99
58	0.90	0.45	272.27	157.78	…	…	…	…	38.62	58.22
59	0.91	0.45	273.66	159.41	…	…	…	…	48.00	72.45
60	0.91	0.46	275.06	161.04	…	…	…	…	37.86	75.20
61	0.91	0.46	256.94	151.19	-18.12	-9.85	-46.61	-17.53	28.10	78.05
62	0.91	0.46	239.19	141.45	-17.75	-9.74	-45.25	-17.02	18.70	81.01
63	0.92	0.46	221.81	131.81	-17.38	-9.64	-43.93	-16.52	9.67	84.08
64	0.92	0.47	204.79	122.29	-17.02	-9.53	-42.65	-16.04	0.98	87.26
65	0.92	0.47	188.12	112.87	-16.67	-9.42	-41.41	-15.57	-8.21	89.55
66	0.92	0.47	170.95	102.56	-17.17	-10.30	-40.21	-15.12	-16.90	92.14
67	0.92	0.47	154.27	92.56	-16.67	-10.00	-39.03	-14.68	-25.11	95.03
68	0.92	0.47	138.08	82.85	-16.19	-9.71	-37.90	-14.25	-32.84	98.19
69	0.92	0.47	122.37	73.42	-15.72	-9.43	-36.79	-13.84	-40.12	101.64
70	0.92	0.47	107.11	64.26	-15.26	-9.15	-35.72	-13.43	-46.95	105.34
	Earnings	**Domestic**								
Employed	12.60	3.44								
Retired	6.24	8.05								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C19. Incentive calculations, the Netherlands average earnings men, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.80	0.44	266.85	162.41	…	…	…	…	12.45	16.04
56	0.80	0.44	269.64	165.86	…	…	…	…	23.02	29.76
57	0.80	0.45	270.55	166.98	…	…	…	…	34.00	43.99
58	0.81	0.45	271.88	168.62	…	…	…	…	44.98	58.22
59	0.81	0.45	273.20	170.25	…	…	…	…	55.97	72.45
60	0.81	0.46	274.52	171.88	…	…	…	…	47.48	74.43
61	0.81	0.46	256.37	161.27	-18.15	-10.62	-86.35	-51.14	39.37	76.54
62	0.82	0.46	238.61	150.78	-17.77	-10.49	-84.56	-50.55	31.64	78.78
63	0.82	0.46	221.21	140.43	-17.39	-10.36	-82.81	-49.95	24.27	81.15
64	0.82	0.47	204.19	130.20	-17.03	-10.23	-81.09	-49.36	17.27	83.65
65	0.82	0.47	187.52	120.10	-16.67	-10.10	-79.42	-48.77	9.81	85.28
66	0.82	0.47	170.40	109.13	-17.12	-10.96	-81.78	-53.12	2.85	87.23
67	0.82	0.47	153.78	98.49	-16.62	-10.64	-79.40	-51.58	-3.63	89.49
68	0.82	0.47	137.65	88.15	-16.14	-10.33	-77.08	-50.07	-9.64	92.06
69	0.82	0.47	121.98	78.12	-15.67	-10.03	-74.84	-48.62	-15.19	94.91
70	0.82	0.47	106.77	68.38	-15.21	-9.74	-72.66	-47.20	-20.29	98.05

	Earnings	**Domestic**
Employed	12.60	4.72
Retired	6.24	7.66

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C20. Incentive calculations, the Netherlands average earnings women, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.90	0.39	107.09	72.97	…	…	…	…	7.43	8.39
56	0.90	0.39	109.50	72.97	…	…	…	…	13.24	16.78
57	0.90	0.39	110.28	72.97	…	…	…	…	19.41	25.18
58	0.90	0.39	111.42	72.97	…	…	…	…	25.58	33.57
59	0.90	0.39	112.56	72.97	…	…	…	…	31.74	41.96
60	0.90	0.39	113.70	72.97	…	…	…	…	31.13	46.04
61	0.90	0.39	108.06	68.66	-5.64	-4.31	-59.85	-54.55	30.58	50.25
62	0.90	0.39	102.49	64.48	-5.58	-4.18	-58.91	-52.96	30.10	54.58
63	0.90	0.39	96.97	60.42	-5.51	-4.06	-57.98	-51.42	29.68	59.03
64	0.90	0.39	91.53	56.48	-5.45	-3.94	-57.07	-49.92	29.32	63.60
65	0.90	0.39	86.15	52.65	-5.38	-3.83	-56.16	-48.47	28.27	68.27
66	0.90	0.39	80.07	48.93	-6.08	-3.72	-61.45	-47.06	27.39	73.06
67	0.90	0.39	74.16	45.32	-5.90	-3.61	-59.66	-45.69	26.69	77.95
68	0.90	0.39	68.43	41.82	-5.73	-3.50	-57.93	-44.36	26.15	82.94
69	0.90	0.39	62.86	38.42	-5.57	-3.40	-56.24	-43.06	25.77	88.03
70	0.90	0.39	57.46	35.12	-5.40	-3.30	-54.60	-41.81	25.55	93.21
	Earnings	**Domestic**								
Employed	8.39	7.76								
Retired	2.99	11.12								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C21. Incentive calculations, the Netherlands average earnings women, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.73	0.37	125.68	87.70	…	…	…	…	10.89	11.70
56	0.74	0.38	128.32	90.73	…	…	…	…	19.63	19.98
57	0.74	0.38	129.18	90.73	…	…	…	…	28.94	28.45
58	0.74	0.38	130.42	90.73	…	…	…	…	38.26	36.92
59	0.74	0.38	131.67	90.73	…	…	…	…	47.57	45.39
60	0.74	0.38	132.92	90.73	…	…	…	…	48.96	48.51
61	0.74	0.38	126.25	85.37	-6.67	-5.36	-70.91	-65.81	50.44	51.78
62	0.74	0.38	119.66	80.17	-6.59	-5.20	-69.74	-63.89	52.01	55.20
63	0.74	0.38	113.16	75.12	-6.50	-5.05	-68.58	-62.03	53.66	58.77
64	0.74	0.38	106.74	70.22	-6.42	-4.90	-67.44	-60.22	55.39	62.48
65	0.74	0.38	100.40	65.46	-6.33	-4.76	-66.32	-58.47	56.37	66.33
66	0.74	0.38	93.32	60.84	-7.09	-4.62	-72.09	-56.77	57.55	70.32
67	0.74	0.38	86.44	56.35	-6.88	-4.49	-69.99	-55.11	58.94	74.43
68	0.74	0.38	79.75	52.00	-6.68	-4.36	-67.95	-53.51	60.52	78.68
69	0.74	0.38	73.27	47.77	-6.49	-4.23	-65.97	-51.95	62.29	83.04
70	0.74	0.38	66.97	43.66	-6.30	-4.11	-64.05	-50.44	64.24	87.53
	Earnings	**Domestic**								
Employed	8.66	9.85								
Retired	2.99	10.25								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C22. Incentive calculations, Portugal average earnings men, all

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.97	0.79	45.39	35.99	…	…	…	…	5.04	5.92
56	0.99	0.82	47.91	37.19	1.64	1.84	39.75	44.71	10.08	11.83
57	1.01	0.84	50.43	38.39	1.64	1.84	39.75	44.71	15.12	17.75
58	1.04	0.87	52.95	39.59	1.64	1.84	39.75	44.71	20.16	23.67
59	1.06	0.89	55.47	40.79	1.64	1.84	39.75	44.71	25.20	29.59
60	1.08	0.92	56.89	41.99	1.64	1.84	39.75	44.71	24.73	30.76
61	1.11	0.95	54.74	40.14	-3.87	-2.91	-94.80	-70.56	24.19	31.81
62	1.13	0.97	52.51	38.21	-3.94	-3.03	-96.49	-73.51	23.58	32.74
63	1.15	1.00	50.21	36.21	-4.00	-3.14	-98.05	-76.29	22.91	33.57
64	1.18	1.03	47.86	34.14	-4.07	-3.25	-99.49	-78.89	22.19	34.29
65	1.20	1.05	45.19	32.01	-4.12	-3.35	-100.81	-81.34	20.43	33.82
66	1.20	1.05	41.86	29.09	-5.16	-4.55	-125.89	-110.47	18.81	33.48
67	1.20	1.05	38.67	26.25	-5.01	-4.42	-122.22	-107.26	17.35	33.27
68	1.20	1.05	35.60	23.50	-4.86	-4.29	-118.66	-104.13	16.03	33.19
69	1.20	1.05	32.64	20.82	-4.72	-4.16	-115.21	-101.10	14.84	33.22
70	1.20	1.05	29.81	18.23	-4.58	-4.04	-74.80	-65.26	13.79	33.38
	Earnings	**Domestic**								
Employed	4.08	0.50								
Retired	3.23	1.18								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C23. Incentive calculations, Portugal average earnings women, all

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	1.03	0.77	51.77	53.33	…	…	…	…	3.84	5.00
56	1.04	0.80	53.50	55.10	1.73	1.78	54.56	58.17	7.67	10.00
57	1.06	0.83	55.22	56.88	1.73	1.78	54.56	58.17	11.51	15.01
58	1.08	0.85	56.95	58.66	1.73	1.78	54.56	58.17	15.35	20.01
59	1.10	0.88	58.68	60.44	1.73	1.78	54.56	58.17	19.18	25.01
60	1.12	0.90	60.40	62.21	1.73	1.78	54.56	58.17	19.24	26.11
61	1.14	0.93	58.34	60.09	-2.06	-2.12	-65.09	-69.41	19.19	27.12
62	1.15	0.95	56.19	57.87	-2.16	-2.22	-68.16	-72.68	19.06	28.03
63	1.17	0.98	53.94	55.56	-2.25	-2.31	-71.04	-75.75	18.83	28.85
64	1.19	1.01	51.61	53.16	-2.33	-2.40	-73.75	-78.64	18.53	29.59
65	1.21	1.03	49.19	50.67	-2.41	-2.49	-76.29	-81.35	17.02	29.07
66	1.21	1.03	45.57	46.93	-3.63	-3.74	-114.68	-122.28	15.61	28.67
67	1.21	1.03	42.04	43.31	-3.52	-3.63	-111.34	-118.72	14.30	28.37
68	1.21	1.03	38.63	39.78	-3.42	-3.52	-108.10	-115.26	13.09	28.18
69	1.21	1.03	35.31	36.36	-3.32	-3.42	-104.95	-111.91	11.98	28.08
70	1.21	1.03	32.08	33.05	-3.22	-3.32	-101.89	-108.65	10.96	28.08
	Earnings	**Domestic**								
Employed	3.22	2.18								
Retired	3.23	1.18								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C24. Incentive calculations, the United Kingdom average earnings men, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.60	0.23	206.34	86.48	…	…	…	…	16.75	19.19
56	0.60	0.23	208.18	88.69	1.83	2.22	7.87	9.62	33.51	38.37
57	0.61	0.24	210.01	90.91	1.83	2.22	7.87	9.62	50.26	57.56
58	0.61	0.25	211.84	93.13	1.83	2.22	7.87	9.62	67.01	76.74
59	0.61	0.25	213.68	95.34	1.83	2.22	7.87	9.62	83.76	95.93
60	0.62	0.26	215.51	97.56	1.83	2.22	7.87	9.62	85.18	106.59
61	0.62	0.26	202.00	92.74	-13.51	-4.83	-61.20	-20.93	86.78	117.14
62	0.63	0.27	188.68	87.81	-13.32	-4.93	-60.29	-21.38	88.57	127.60
63	0.63	0.27	175.56	82.78	-13.13	-5.03	-59.38	-21.80	90.55	137.98
64	0.64	0.28	162.62	77.67	-12.94	-5.11	-58.49	-22.18	160.11	232.08
65	0.95	0.68	217.26	156.29	54.64	78.62	254.40	368.82	156.31	234.64
66	0.96	0.68	198.53	143.36	-18.72	-12.92	-85.21	-58.59	152.86	237.36
67	0.96	0.69	180.17	130.59	-18.36	-12.77	-83.52	-57.85	149.78	240.23
68	0.97	0.70	162.16	117.98	-18.01	-12.62	-81.87	-57.12	147.03	243.25
69	0.97	0.70	144.50	105.51	-17.66	-12.47	-80.25	-56.39	144.63	246.42
70	0.98	0.71	127.18	93.20	-17.32	-12.31	-78.66	-55.67	142.56	249.74
	Earnings	**Domestic**								
Employed	22.20	4.45								
Retired	5.17	9.26								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C25. Incentive calculations, the United Kingdom average earnings men, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.50	0.23	173.57	86.48	…	…	…	…	19.47	19.54
56	0.50	0.23	175.33	88.69	1.76	2.22	7.55	9.62	38.94	39.08
57	0.50	0.24	177.09	90.91	1.76	2.22	7.55	9.62	58.41	58.62
58	0.51	0.25	178.85	93.13	1.76	2.22	7.55	9.62	77.88	78.16
59	0.51	0.25	180.62	95.34	1.76	2.22	7.55	9.62	97.35	97.69
60	0.52	0.26	182.38	97.56	1.76	2.22	7.55	9.62	103.83	108.35
61	0.52	0.26	171.14	92.74	-11.24	-4.83	-50.65	-20.93	110.43	118.91
62	0.53	0.27	160.04	87.81	-11.10	-4.93	-50.00	-21.38	117.17	129.37
63	0.53	0.27	149.07	82.78	-10.97	-5.03	-49.36	-21.80	124.04	139.74
64	0.54	0.28	138.23	77.67	-10.84	-5.11	-48.72	-22.18	195.49	233.85
65	0.83	0.68	191.97	156.29	53.74	78.62	249.76	368.82	196.74	236.41
66	0.84	0.68	175.51	143.36	-16.46	-12.92	-74.66	-58.59	198.29	239.13
67	0.84	0.69	159.36	130.59	-16.15	-12.77	-73.24	-57.85	200.14	241.99
68	0.85	0.70	143.50	117.98	-15.86	-12.62	-71.85	-57.12	202.28	245.01
69	0.85	0.70	127.93	105.51	-15.57	-12.47	-70.49	-56.39	204.71	248.19
70	0.86	0.71	112.65	93.20	-15.28	-12.31	-69.16	-55.67	207.42	251.51

	Earnings	**Domestic**
Employed	22.20	5.51
Retired	5.17	7.53

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C26. Incentive calculations, the United Kingdom average earnings women, healthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.62	0.21	178.38	63.26	…	…	…	…	14.24	17.34
56	0.63	0.22	179.56	64.89	1.18	1.62	6.42	9.24	28.48	34.69
57	0.63	0.22	180.74	66.51	1.18	1.62	6.42	9.24	42.72	52.03
58	0.63	0.23	181.92	68.13	1.18	1.62	6.42	9.24	56.96	69.38
59	0.64	0.23	183.10	69.75	1.18	1.62	6.42	9.24	71.20	86.72
60	0.64	0.24	184.28	71.37	1.18	1.62	6.42	9.24	152.67	213.68
61	0.95	0.63	252.71	185.06	68.42	113.68	445.56	793.97	150.23	216.15
62	0.96	0.64	237.20	174.26	-15.50	-10.80	-100.73	-71.32	148.12	218.79
63	0.96	0.64	222.04	163.62	-15.16	-10.64	-98.39	-70.12	146.36	221.59
64	0.96	0.65	207.22	153.14	-14.82	-10.48	-96.11	-68.94	144.92	224.55
65	0.97	0.73	192.72	142.82	-14.50	-10.32	-93.89	-67.77	143.80	227.66
66	0.97	0.74	178.54	132.65	-14.18	-10.16	-91.72	-66.63	142.99	230.92
67	0.97	0.74	164.68	122.64	-13.86	-10.01	-89.60	-65.50	142.49	234.34
68	0.98	0.75	151.12	112.79	-13.56	-9.86	-87.54	-64.40	142.29	237.91
69	0.98	0.75	137.86	103.08	-13.26	-9.71	-85.52	-63.31	142.37	241.63
70	0.98	0.76 …		93.52	-12.97	-9.56	-83.56	-62.24	142.75	245.49
	Earnings	**Domestic**								
Employed	16.61	7.34								
Retired	3.52	10.89								

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Table C27. Incentive calculations, the United Kingdom average earnings women, unhealthy

Last year of work	Replacement Rate		Pension Wealth		Accrual		Tax/Subsidy (%)		Option Value	
	Total	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**	**Total**	**Partial**
55	0.50	0.25	217.29	115.20	…	…	…	…	23.53	23.58
56	0.51	0.25	219.69	118.15	2.40	2.95	9.61	12.32	47.05	47.15
57	0.51	0.26	222.09	121.11	2.40	2.95	9.61	12.32	70.58	70.73
58	0.52	0.27	224.49	124.06	2.40	2.95	9.61	12.32	94.11	94.31
59	0.52	0.27	226.88	127.01	2.40	2.95	9.61	12.32	117.64	117.89
60	0.53	0.28	229.28	129.97	2.40	2.95	9.61	12.32	222.94	255.98
61	0.79	0.56	313.45	249.54	84.17	119.57	398.25	599.06	225.67	260.62
62	0.79	0.57	295.05	235.66	-18.40	-13.88	-85.55	-64.72	228.71	265.38
63	0.80	0.57	276.97	221.90	-18.08	-13.76	-83.96	-64.00	232.07	270.27
64	0.80	0.58	259.20	208.27	-17.77	-13.63	-82.40	-63.29	235.73	275.29
65	0.81	0.67	241.73	194.76	-17.47	-13.50	-80.87	-62.57	239.70	280.44
66	0.81	0.67	224.56	181.39	-17.17	-13.37	-79.36	-61.86	243.95	285.72
67	0.82	0.68	207.69	168.15	-16.87	-13.24	-77.89	-61.14	248.50	291.13
68	0.82	0.69	191.11	155.04	-16.58	-13.11	-76.44	-60.43	253.34	296.68
69	0.83	0.69	174.81	142.07	-16.29	-12.98	-75.02	-59.72	258.46	302.36
70	0.83	0.70 …		129.22	-16.01	-12.84	-73.63	-59.01	263.85	308.17

	Earnings	**Domestic**
Employed	23.17	6.31
Retired	5.97	8.35

Tax/Subsidy (%) is pension wealth accrual as percentage of after-tax wage earnings.

Earnings = Net wages (employed), net pension (retired) in thousand euros. Domestic=Value of domestic work

Appendix D. Pension Rules and Tax Treatments in 2000

Belgium

The accrual rate is 2.7% and the maximum pension is rate is 60%. The pension rate is 75% in the public sector and 60% for wage earners and the self-employed, unless it concerns a married person with a dependent spouse who does not receive any income or benefits (then also 75%). The minimum pension is €741.15 for single people, €926.13 for married people. These are minimum pensions for a full career. Pensionable age is 60 years.

Men may retire at the age of 60 if replaced by unemployed persons. Women may retire if unemployed or disabled between the age of 61 and 65. People can retire as of the age of 60 with 26-year career for retirement in 2000 (22-year career in 1998, 24-year career in 1999, 30-year career in 2002, 32-year career in 2003, 34-year career in 2004, 35-year career in 2005).

Social security contributions are paid based on the total amount of the pension, but are not the same as for employed people. Wage earners pay 3.55% social security contributions for sickness and invalidity, provided that (in 2001) this contribution does not mean that the pension paid to single people is less than €1116,73 or €1395,91 for married people. On top of that, another contribution ranging between 0.5 and 2% is paid for pension financing, according to the pension level and only for people receiving pensions higher than €1974,6 (single) or €2256,68 (married). This is called the 'solidarity contribution'. Civil servants pay the same contributions + 0.5% to finance funeral benefits.

Self-employed people do not pay contributions from their pensions. Their pensions are financed by the contributions paid during their career and an annual federal amount. As for taxes, the normal tax rates apply to pensions, as can be found in Table 5. Since pensions are replacement income, a reduction is allowed of €1478,76 (per year) for single people and €1726,65 (per year) for families. Wage-earner and self-employed pensions follow the evolution of the consumer price index, that is, the health consumer price index, corrected for cigarettes, etc. These pensions are also irregularly adapted to the living standards.

Tax treatment of wage income

1. Central government income tax

    1.1 Standard allowances

    - Social security payments deductible
    - A deduction for work-related expenses from taxable income net of social security payments according to the following schedule:

Gross wage less soc sec. payments (BEF)	%
< 168 000	20
168 000 – 337 000	10
337 000 – 561 000	5
> 561 000	3

- 210 000 BEF tax credit for single taxpayers

1.2 Income tax rate schedule

Taxable income (BEF)	Marginal tax rate (%)
< 258 000	25
258 000 – 342 000	30
342 000 – 488 000	40
488 000 – 1 123 000	45
1 123 000 – 1 684 000	50
1 684 000 – 2 470 000	52.5
> 2 470 000	55

2. Local income tax
   - Local income tax rates set by municipalities, average rate 7% of gross income
3. Social security contributions
   3.1 Employer
   - Average employer social security contribution 34.7% of the gross wage

   3.2 Employee
   - Pension insurance: 7.5% of the gross wage
   - Unemployment insurance: 0.87% of the gross wage.
   - Sickness insurance: 3.55% of the gross wage
4. Consumption tax
   - Standard value added tax rate 23%.

Denmark

The basic old age pension is DKK 4002 a month (48024 a year), supplementary 3968 a month (47616 a year). Universal partial early retirement pension is assumed to be the maximum 79 464 a year. The basic pension is reduced if the conditions for obtaining a full pension (40 years of residence) are not fulfilled. In this last case: 1/40 of full pension for each year of residence between the ages of 15 and 67 (65).

The special pension scheme (SP): maximum monthly benefits paid for 10 years. From the age of 65 a person may be eligible for the old-age pension, which consists of a basic amount and a pension supplement. The supplementary pension is 3968 a month (47616 a year), for single pensioners and DKK 21,468 a year for others. The supplementary pension (ATP-pension), if the insured has been affiliated to the supplementary scheme since 1 April 1964 and has always worked full-time since then, is a max 18,000 otherwise ignored (see europa.eu.int/comm/employment_social).

Tax treatment of wage income

1. Central government income tax
   - 1.1 Tax credits
     - For central government income tax DKK 2 338 5
     - For local government income tax and church tax DKK 10 955
   - 1.2 Income tax rate schedule

Bracket	Threshold (DKK)	Rate (%)
Low		7
Medium	164 300	6
High	267 600	15

2. Local income tax
   - 2.1 Local income tax rates
     - Municipality tax 21.7%, County tax 11%, Church tax 1%
3. Social security contributions
   - 3.1 Employer
     - DKK 1789 for the Labour Market Supplementary Pension Scheme
   - 3.2 Employee
     - Social security contributions 8% of the gross wage added with 1% of the gross wage towards the Labour Market Supplementary Pension Scheme
     - DKK 849 for the Labour Market Supplementary Pension Scheme
     - DKK 6 840 for unemployment insurance
4. Consumption tax
   - Standard value added tax rate 25%.

[5] €1 = DKK 7.4317

Finland

Old system:

Pension accrual 1.5% and 60-64 2.5%, early retirement pension 60-64 reduced by 5.64-6% depending on the birth year. Government pension 2547 a month, 2272 for a married person, depending on the municipality of residence. Reduced by one-half of the amount exceeding 245 a month of the pension based on employment contracts. Not paid if earnings-related pension exceeds 5090-5311 a month, depending on municipality. A married person: no pension if his earnings-related pension exceeds 4484-4672 a month (1998 figures). Pension income is taxable. Additional sickness insurance for pensioners is 2.7 (in addition to 1.5).

New system:

Pension accrual starts at age 18 based on the whole working career, accrual is 1.5% before 53, 1.9% at the age of 53-62 and 4.5% in age 63-68. The new system is partly financed by an increase in the social security payment of employees by 30% from age 54 onwards. Pension is reduced by 7.2 at age 62 if retirement takes place at age 62 and not at age 63. However, entitlement to unemployment benefits and from there to pension at 62 years keeps the pensionable age at 60 years as before. Pension income is taxable. Additional sickness insurance for pensioners is 2.7 (in addition to 1.5).

1) If unemployed at 60 years one can have pensions without deductions; the accrual rate stays positive at 1.9% a year. Assumed that unemployment benefits are 60% of earnings

2) An unemployed person at the age of 63 is entitled to a full pension. If he or she retires a year earlier, the pension is deducted by 7.2%.

Tax treatment of wage income

1. Central government income tax

   1.1 Standard allowances

   - Work-related expenses: deduction equal to 3% of wages up to a maximum of FIM 2 4006

   1.2 Income tax rate schedule

[6] € 1 = FIM 5.94573.

Taxable income (FIM)	Tax on lower limit (FIM)	Tax on wage exceeding the upper limit (%)
47 600 – 63 600	50	5
63 600 – 81 000	850	15
81 000 – 113 000	3 460	19
113 000 – 178 000	9 540	25
178 000 – 315 000	25 790	31
315 000 –	68 260	37.5

2. Local income tax

   2.1 Allowances

   - Deduction from wage: 20% of income exceeding FIM 15 000 up to a maximum of FIM 9 800. The allowance is reduced by 3.5% for income exceeding FIM 75 000. Basic deduction: FIM 8 800

   2.2 Local income tax rate

   - Average municipal income tax rate 17.67% of the gross wage. Church tax 1.3% of the gross wage

3. Social security contributions

   3.1 Employer

   - Average employer social security contribution 26% of the gross wage

   3.2 Employee

   - Pension insurance: 4.7% of the gross wage. At age 54, increased by 30%. Unemployment insurance: 1% of the gross wage. At age 54, increased by 30%. Pension and unemployment insurance payments are deductible for income tax purposes
   - Sickness insurance: 1.5% of the gross wage

4. Consumption tax

   - Standard value added tax rate 22%.

Germany

Entitlement to the old-age pension is at 63 with 35 years of contribution, at 65 with 5 years. Retirement age has been 60 for women, but is being gradually shifted to 65 (assumed for both genders). The maximum of pensions is 75% of average earnings of all insured. Old-age pension benefits=earnings points*pension factor*pension value. Earnings points= annual earnings divided by the average earnings of all contributors. Pension factor=1 (increases if retirement postponed). Pension value= monthly benefit amount for one year's average covered earnings. For delayed

retirement after age 65, an added factor of 1.0 plus .005 for each month is used to increase the benefit (pension factor). Pension for low income earners: for people with 35 years of insurance, earning points are adjusted, if need be, up to 1.5 times the average value, up to a maximum of 75% of average earnings of all insured (social security around the world). Average gr. earnings of all contributors in 1999: €53508 (1.95583*27358). The average net earnings of all contributors in 1999 was €33,517 (1.95583*17137) and in 2000 it was €34,143. Contributions levied on earnings between a floor of 1% and a ceiling of 170% of average earnings, about 272.58 DEM and 46338.6 DEM in 1999. Benefits adjusted annually for changes in the real value of pensions compared with changes in earnings. Reference earnings: Insured employment income (up to contribution ceiling) during the entire duration of the insurance period. The monthly contribution ceiling for 2000 is: West: DEM 8,600 (€4,397) East: DEM 7,100 (€3,630) (see http://europa.eu.int/comm/employment_social/missoc2000/d_part6_en.htm)

Occupational pension income eligible for work-related expenses is 40% of benefits not taxable up to ceilings (DEM 6000 for occupational plans). Without any special reliefs, DEM 13000 was exempt from tax in 1999 (corrected for 2000). At age 62, 27% of the pension is taxable, 38% at 55, 32% at 60, 21% at 70, with an additional deduction of DEM 200.

Tax treatment of wage income

1. Central government income tax

   1.1 Standard allowances

   - Allowance of 6000 DEM for single taxpayers
   - Deduction for work-related expenses 2000 DEM
   - Social security payments exceeding (DEM 6000 – 0.16*gross wage) up to DEM 2610 deductible. Half of further payments deductible up to DEM 1305. The 16% of the gross wage subtracted from the limit of DEM 6000 represent the employers' social security payments.

   1.2 Income tax rate schedule

   - Taxable income is rounded down to the next full DEM amount divisible by 54 and the income tax liability is calculated by the following formulae

     $$Y = \frac{X - 13446}{10000} \quad \text{and} \quad Z = \frac{X - 17442}{10000}$$

     where X is the rounded taxable income, and Y and Z determine the tax liability (T) in DEM according to the following schedule:

X	T
< 13 499	0
13 500 – 17 495	(262.76Y + 2 290)Y
17 496 – 114 695	(133.74Z + 2 500)Z + 957
> 114 696	0.51X – 20 575

2. Local income tax
   - There are no local income taxes or deductions in Germany
3. Social security contributions
   - 3.1 Employer
     - Employer pays the same amount as the employee in pension, sickness, unemployment and medical care insurances
   - 3.2 Employee
     - Pension insurance: 9.65% of the gross wage or 9.65% of the insurable ceiling of DEM 103200, whichever is lower.
     - Unemployment insurance: 3.25% of the gross wage or 3.25% of the insurable ceiling of DEM 103200, whichever is lower.
     - Sickness insurance: 6.75% of the gross wage or 6.75% of the insurable ceiling of DEM 77400, whichever is lower.
     - Care insurance: 0.85% of the gross wage or 0.85% of the insurable ceiling of DEM 77400, whichever is lower.
4. Consumption tax
   - Standard value added tax rate 16%

The Netherlands

Assumed: at 67% level only public pension 1163 (social security around the world), at 100 and 167, 70% of income if 40 yrs at work (OECD Ageing and Income, p.61). The additional allowance is NLG 511, which increased to NLG 2152 for incomes under NLG 56974 additional deduction for basic pension, NLG 511 or NLG 3057 for incomes under 56974 (OECD Taxing Wages, p. 29). The public pension is only for those aged 65 or older: APW67 no benefits before 65.

Tax treatment of wage income

1. Central government income tax
   - 1.1 Standard allowances
     - Basic allowance of NLG 8 949 for all taxpayers

- Deduction for work-related expenses 12% of the gross wage, with a minimum of NLG 263 and a maximum of NLG 3538
- Unemployment insurance payments deductible

1.2 Income tax rate schedule

Taxable income (NLG)	Tax rate (%)
< 15 255	4.5
15 256 – 48 994	8.55
48 995 – 107 756	50
> 107 756	60

2. Local income tax
   - There are no local income taxes or deductions in the Netherlands
3. Social security contributions

   3.1 Employer
   - Unemployment insurance: 4.8% of the gross wage less the basic allowance
   - Invalidity insurance: 7.7% of the gross wage less the basic allowance
   - Medical care insurance: 6.35% of the gross wage less the basic allowance

   3.2 Employee
   - Old age pension insurance, widows' and orphans' pension insurance, and insurance for exceptional medical expenses form the general social security scheme. Payments are levied together with income tax in the first and second income bracket. Combined, they constitute 29.4% of taxable income.
   - Unemployment insurance: 6.25% of the gross wage less the basic allowance. No payment if the wage is below 28971.
   - Health insurance: 1.75% of the gross wage less the basic allowance if the wage is below 64 600 plus additional NLG 414 a year per adult.
4. Consumption tax
   - Standard value added tax rate 19%

Portugal

Old-age pension: Accrual rate 2%, income base is average earnings in the best 10 yrs. during the last 15 yrs of contribution. Minimum monthly pension 30% of average monthly earnings (PTE 307977 a year), maximum 80% of average monthly earnings (PTE 820552 a year) (Soc. Sec. World)

Tax treatment of wage income

1. Central government income tax

   1.1 Standard allowances

   - Basic allowance of 70% of the gross income or 72% of the yearly minimum wage, whichever is greater
   - A tax credit of 36720 for each single taxpayer and an additional credit according to the income bracket (see income tax rate schedule)

   1.2 Income tax rate schedule

Taxable income (PTE)	Marginal tax rate (%)	Additional tax credit
< 730 000	14	
730 000 – 1 149 000	15	7 300
1 149 000 – 2 840 000	25	122 200
2 840 000 – 6 581 000	35	406 200
> 6 581 000	40	735 250

2. Local income tax
   - There are no local income taxes or deductions in Portugal
3. Social security contributions

   3.1 Employer
   - 23% of the gross wage

   3.2 Employee
   - 11% of the gross wage
4. Consumption tax
   - Standard value added tax rate 17%.

United Kingdom

Basic state pension £66.75 a week = £3471 a year for men over 65 and women over 60, contribution requirements 44 yrs for men and 39 yrs for women. SERPS (State Earnings-Related Pension Scheme) accrual 1.25% of the revalued average earnings during contribution years, ceiling £131.22 a week = 6823.44 a year. Original replacement target 25% of the average of the best 20 years of earnings, now being shifted towards 20% of lifetime average earnings. Contribution requirements 44 years for women and 49 for men, assumes the individual started working at 16 and retires with full pension at 60 (women) and at 65 (men). Here accrual calculated based on 20% replacement assuming full contribution and full benefits at retirement age. (Gruber and Wise, pp. 415-420)

Tax treatment of wage income

1. Central government income tax

   1.1 Standard allowances

   - A personal allowance of GBP 4385 for all taxpayers

   1.2 Income tax rate schedule

Taxable income	Marginal tax rate (%)
< 1 520	10
1 520 – 28 400	22
> 28 400	40

2. Local income tax

   - There are no local income taxes or deductions in the UK

3. Social security contributions

   3.1 Employer

   - 12.2% of gross wages exceeding GBP 4368 a year

   3.2 Employee

   - 10% of gross wages between GBP 3952 and GBP 27820

4. Consumption tax

   - Standard value added tax rate 17.5%.

AGIR – Ageing, Health and Retirement in Europe

AGIR is the title of a major study on the process of population ageing in Europe and its future economic consequences. This project was motivated by an interest in verifying whether people are not only living longer but also in better health. It aims at analysing how the economic impact of population ageing could vary when not only demographic factors, but also health developments are taken into consideration. The project started in January 2002 for a period of three years.

The **principal objectives** of the study are to:

- document developments in the health of the elderly, ideally since 1950, based on a systematic collection of existing national data on the health and morbidity of different cohorts of the population;
- analyse retirement decisions and the demand for health care as a function of age, health and the utility of work and leisure;
- combine these results, and on that basis to elaborate scenarios for the future evolution of expenditure on health care and pensions; and
- analyse the potential macroeconomic consequences of different measures aiming at improving the sustainability of the European pension systems.

The **AGIR** project is carried out by a consortium of nine European research institutes, most of which are members of ENEPRI:

- **CEPS** (Centre for European Policy Studies), Brussels
- **CEPII** (Centre d'Etudes Prospectives et d'Informations Internationales), Paris
- **CPB** (Netherlands Bureau for Economic Policy Analysis), The Hague
- **DIW** (Deutsches Institut für Wirtschaftsforschung), Berlin
- **ETLA** (the Research Institute of the Finnish Economy), Helsinki
- **FEDEA** (Fundación de Estudios de Economía Aplicada), Madrid
- **FPB** (Belgian Federal Planning Bureau), Brussels
- **NIESR** (National Institute for Economic and Social Research), London
- **LEGOS** (Laboratoire d'Economie et de Gestion des Organisations de Santé, Université de Paris-Dauphine), Paris

It has received finance from the European Commission, under the Quality of Life Programme of the 5th EU Research Framework Programme. The project is coordinated by Jorgen Mortensen, Associate Senior Research Fellow at CEPS. For further information, contact him at: jorgen.mortensen@ceps.be.

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